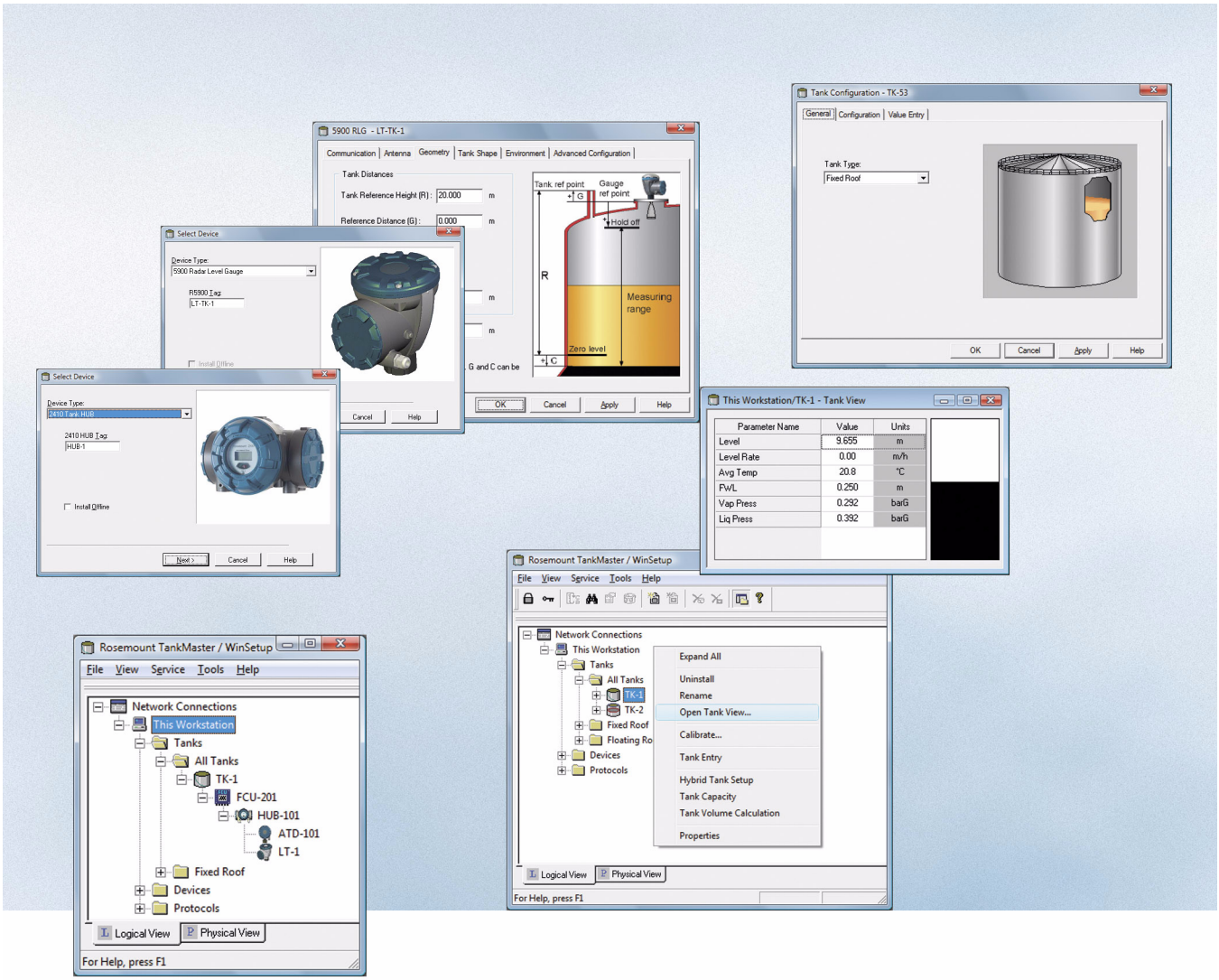
System Configuration Manual
300510EN, Rev AA
December 2010

Raptor

Tank Gauging System



OPC FOUNDATION MEMBER

ROSEMOUNT® Tank Gauging

www.rosemount-tg.com

EMERSON™ Process Management

Rosemount Raptor

Configuration with Rosemount TankMaster WinSetup

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

For equipment service or support needs, contact your local Emerson Process Management/Rosemount Tank Gauging representative.

Version

This manual is based on the functionality of TankMaster WinSetup version 6.x.
For older TankMaster versions all functionality described in this manual may not be available and the Graphical User Interface (GUI) may look different.

Cover Photo: system_config_front.tif

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Section 1 Introduction

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This manual describes the recommended installation procedure for setting up a Rosemount Raptor system. It is based on using the TankMaster Winsetup program as a configuration tool. The manual also provides information on the basic functions of the TankMaster WinSetup configuration tool.

The *Raptor System Configuration* manual guides you through the process of setting up a Raptor system with field devices and tanks for operation in TankMaster.

The *Rosemount Raptor* product portfolio includes a wide range of components for small and large customized tank gauging systems. The system includes various field devices, such as radar level gauges, temperature transmitters, and pressure transmitters for complete inventory control. The TankMaster software suite provides you with the tools that you need to configure and operate the Rosemount Raptor system.

1.1 MANUAL OVERVIEW

The *Raptor System Configuration* manual includes the following sections:

Section 1: Introduction

A description of the various components in the Raptor system.

Section 2: Raptor System Overview

A description of the various components in the Raptor system.

Section 3: Using TankMaster

An introduction to the TankMaster software package.

Section 4: The WinSetup Main Window

An introduction to the basic features of the WinSetup configuration program. It describes the workspace, menus, and various toolbars.

Section 5: Installing a Raptor Level Gauging System

A description of the recommended configuration procedure for a Rosemount Raptor system.

Section 6: Device Handling

A short description of the basic functions for changing device configuration and how to uninstall devices from the WinSetup workspace.

Section 7: Service Functions

A description of various functions supported by TankMaster WinSetup for service and maintenance of different Raptor field devices.

Section 8: Menu Guide

A guide to menus and menu options in the TankMaster WinSetup program.

1.2 TECHNICAL DOCUMENTATION

The Raptor System includes the following documents:

- Raptor Technical Description (704010EN)
- Rosemount 5900S Reference Manual (300520EN)
- Rosemount 2410 Reference Manual (300530EN)
- Rosemount 2240S Reference Manual (300550EN)
- Rosemount 2230 Reference Manual (300560EN)
- Raptor System Configuration Manual (300510EN)
- Rosemount 5300 Product Data Sheet (00813-0100-4530)
- Rosemount 5400 Product Data Sheet (00813-0100-4026)
- Rosemount 5300 Series Reference Manual (00809-0100-4530)
- Rosemount 5400 Series Reference Manual (00809-0100-4026)
- Rosemount TankMaster WinOpi Reference Manual (303028EN)
- Rosemount Raptor Installation Drawings

Section 2 Raptor System Overview

Raptor is a state-of-the art inventory and custody transfer radar tank level gauging system. It is developed for a wide range of applications at refineries, tank farms and fuel depots, and fulfills the highest requirements on performance and safety.

The field devices on the tank communicate over the intrinsically safe *Tankbus*. The Tankbus is based on a standardized fieldbus, the FISCO(1) FOUNDATION™ fieldbus, and allows integration of any device supporting that protocol. By utilizing a bus powered 2-wire intrinsically safe fieldbus the power consumption is minimized. The standardized fieldbus also enables integration of other vendors' equipment on the tank.

The *Raptor* product portfolio includes a wide range of components to build small or large customized tank gauging systems. The system includes various devices, such as radar level gauges, temperature transmitters, and pressure transmitters for complete inventory control. Such systems are easily expanded thanks to the modular design.

Raptor is a versatile system that is compatible with and can emulate all major tank gauging systems. Moreover, the well-proven emulation capability enables step-by-step modernization of a tank farm, from level gauges to control room solutions.

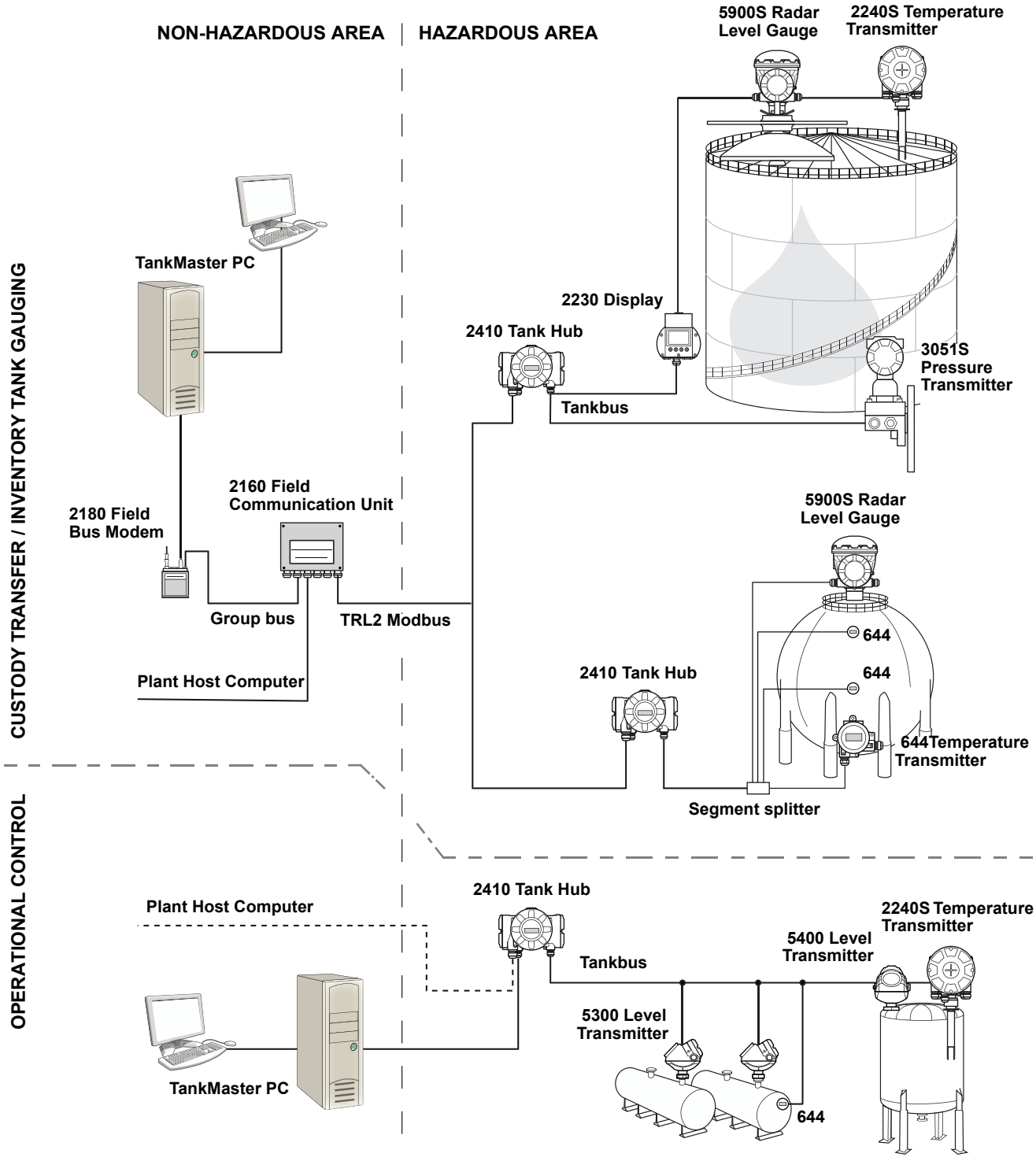
It is possible to replace old mechanical or servo gauges with modern *Raptor* gauges, without replacing the control system or field cabling. It is further possible to replace old HMI/SCADA-systems and field communication devices without replacing the old gauges.

There is a distributed intelligence in the various system units which continuously collect and process measurement data and status information. When a request for information is received an immediate response is sent with updated information.

The flexible *Raptor* system supports several combinations to achieve redundancy, from control room to the different field devices. Redundant network configuration can be achieved at all levels by doubling each unit and using multiple control room work stations.

(1) See documents IEC 61158-2 and IEC/TS 60079-27

Figure 2-1. Raptor system architecture



TankMaster HMI Software

TankMaster is a powerful Windows-based Human Machine Interface (HMI) for complete tank inventory management. It provides configuration, service, set-up, inventory, and custody transfer functions for *Raptor* systems and other supported instruments.

TankMaster is designed to be used in the Microsoft Windows XP and Vista environment providing easy access to measurement data from your Local Area Network.

The *TankMaster WinOpi* program lets the operator monitor measured tank data. It includes alarm handling, batch reports, automatic report handling, historical data sampling as well as inventory calculations such as Volume, Observed Density and other parameters. A plant host computer can be connected for further processing of data.

The *TankMaster WinSetup* program is a graphical user interface for installation, configuration and service of the different devices in the *Raptor* system.

Rosemount 2160 Field Communication Unit

The 2160 Field Communication Unit (FCU) is a data concentrator that continuously polls and stores data from field devices such as radar level gauges and temperature transmitters in a buffer memory. Whenever a request for data is received, the FCU can immediately send data from a group of tanks from the updated buffer memory.

Rosemount 2410 Tank Hub

The Rosemount 2410 Tank Hub acts as a power supply to the connected field devices in the hazardous area using the intrinsically safe Tankbus.

The 2410 collects measurement data and status information from field devices on a tank. It has two external buses for communication with various host systems. There are two versions of the 2410 for single tank or multiple tanks operation. The multiple tanks version supports up to 10 tanks and 16 devices.

The 2410 is equipped with two relays which support configuration of up to 10 “virtual” relay functions allowing you to specify several source signals for each relay.

Rosemount 5900S Radar Level Gauge

The *Rosemount 5900S* Radar Level Gauge is an intelligent instrument for measuring the product level inside a tank. Different antennas can be used in order to meet the requirements of different applications. The 5900S can measure the level of almost any product, including bitumen, crude oil, refined products, aggressive chemicals, LPG and LNG.

The *Rosemount 5900S* sends microwaves towards the surface of the product in the tank. The level is calculated based on the echo from the surface. No part of the 5900S is in actual contact with the product in the tank, and the antenna is the only part of the gauge that is exposed to the tank atmosphere.

The *2-in-1* version of the 5900S Radar Level Gauge has two radar modules in the same transmitter housing allowing two independent level measurements using one antenna.

Rosemount 5300 Guided Wave Radar

The Rosemount 5300 is a premium 2-wire guided wave radar for level measurements on liquids, to be used in a wide range of medium accuracy applications under various tank conditions. Rosemount 5300 includes the 5301 for liquid level measurements and the 5302 for liquid level and interface measurements.

Rosemount 5400 Radar Level Transmitter

The Rosemount 5400 is a reliable 2-wire non-contact radar level transmitter for liquids, to be used in a wide range of medium accuracy applications under various tank conditions.

Rosemount 2240S Multi-Input Temperature Transmitter

The *Rosemount 2240S* Multi-input Temperature Transmitter can connect up to 16 temperature spot sensors and an integrated water level sensor.

Rosemount 2230 Graphical Field Display

The *Rosemount 2230* Graphical Field Display presents inventory tank gauging data such as level, temperature, and pressure. The four softkeys allow you to navigate through the different menus to provide all tank data, directly in the field. The *Rosemount 2230* supports up to 10 tanks. Up to three 2230 displays can be used on a single tank.

Rosemount 644 Temperature Transmitter

The Rosemount 644 is used with single spot temperature sensors.

Rosemount 3051S Pressure Transmitter

The 3051S series consists of transmitters and flanges suitable for all kinds of applications, including crude oil tanks, pressurized tanks and tanks with / without floating roofs.

By using a 3051S Pressure Transmitter near the bottom of the tank as a complement to a 5900S Radar Level Gauge, the density of the product can be calculated and presented. One or more pressure transmitters with different scalings can be used on the same tank to measure vapor and liquid pressure.

Rosemount 2180 Field Bus Modem

The Rosemount 2180 field bus modem (FBM) is used for connecting a TankMaster PC to the TRL2 communication bus. The 2180 is connected to the PC using either the RS232 or the USB interface.

See the *Raptor Technical Description* (Document no. 704010en) for more information on the various devices and options.

Section 3 Using TankMaster

3.1 What is TankMaster? . . . . . page 3-1
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3.1 WHAT IS TANKMASTER?

TankMaster is a software package designed by **Emerson Process Management/Rosemount Tank Gauging** for inventory management as well as configuration of level gauging equipment. The *TankMaster* program package provides you with powerful and easy-to-use tools for installation and configuration of Rosemount's tank gauging system. Devices such as field communication units, Tank Hubs, and radar level gauges can easily be installed.

The operator's interface provides inventory and custody transfer functions and gives you a clear overview of installed devices and tanks. For each tank you can easily see the associated transmitters and data acquisition units.

TankMaster is designed to be used in the Microsoft® Windows XP or Vista environment providing easy access to measurement data from your Local Area Network.

The *TankMaster* system allows you to use various protocols such as the TRL2 Modbus and Enraf GPU. Interfaces such as RS232, and RS485 can be used for communication with field devices. TankMaster clients and servers can be integrated in Local Area Networks (LAN) for maximum availability. You can easily change protocol, device, and tank configuration at any time.

Measured data is presented in real-time and you can customize the view of tank data to suit your needs.

Key Features

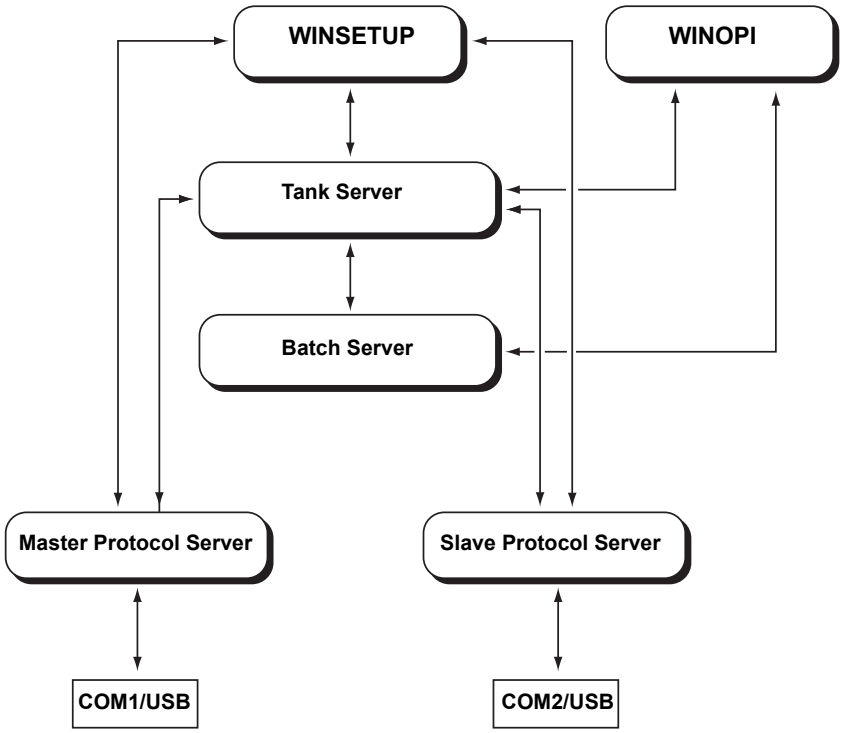
- Monitoring of measured data.
- Clear overview of installed tanks and devices.
- Simple installation by using "wizards".
- Open connectivity.
- Object-oriented user friendly Graphical User Interface.

3.2 TANKMASTER SOFTWARE PACKAGE

Rosemount TankMaster includes several software modules:

- WinOpi
- WinSetup
- Tank Server
- Master Protocol Servers
- Slave Protocol Server
- Batch Server
- Administrator

Figure 3-1. TankMaster software modules



WinOpi is the operator´s interface to the Rosemount Tank Gauging system. It communicates with the *Tank Server* and the different protocol servers to let the user monitor measured tank data. *WinOpi* also provides alarm handling, batch reports, automatic report handling, historical data sampling as well as inventory calculations such as volume, observed density and other parameters.

The *WinSetup* program is a graphical user interface for installation, configuration and service of devices such as the 5900S Radar Level Gauge and the 2240S Multi-input Temperature Transmitter.

The *Tank Server* communicates with devices via the *Master protocol server* and handles configuration data for all the installed tanks and devices. Tank and device names, configuration data such as antenna type, number of connected temperature elements and many other parameters are stored by the *Tank Server*. The *Tank Server* collects measured data from connected devices and provides these data to the *WinOpi/WinSetup* user interface.

The *Master Protocol Server* transfers configuration data and measured data between the *Tank Server* and connected devices in a Rosemount Tank Gauging system. The *Master Protocol Server* is able to communicate with various types of field devices such as radar level gauges, field communication units, temperature transmitters, and pressure sensors to collect measured data such as level, temperature, and pressure.

The *Slave Protocol Server* is used to connect the *TankMaster* system to a host computer (DCS system). The *Slave Protocol Server* exchanges tank data between the *Tank Server* and the host computer.

The *Batch Server* provides functions for starting, monitoring and closing batch transfers betweeen tanks. It also generates various reports during and after a batch transfer.

The *Administrator* program allows you to start and stop TankMaster, and to specify which TankMaster software modules that will start automatically when the PC starts up. It also includes a backup and restore function, and functions for handling redundant Tank Servers and Batch Servers.

OPC Server with Browser

TankMaster uses OPC Data Access 2.0 (OLE for Process Control), an open industry standard, which eliminates the need for costly customized software integration. With the OPC server and the browser it is easy to import all custody transfer and inventory data to other OPC clients such as different DCS:s, PLC:s, Scada systems, or Microsoft Office programs. This way, operators and plant management are better armed to make timely decisions as they work with distributed inventory and tank gauging data. (Website OPC Foundation: www.opcfoundation.org).

Customized views

In TankMaster you can change general and specific tank view and setup windows. There are a number of options to design TankMaster as you like; you can either modify the existing windows or design completely new ones. For example you can have a photo of the plant giving a quick realistic view and just by clicking a specific tank you will get corresponding tank data.

3.3 INSTALLING THE TANKMASTER SOFTWARE

3.3.1 System Requirements

The following system specification is recommended to run TankMaster version 5.B0 or higher(1):

General	
Product	Rosemount TankMaster; WinOpi, Winsetup, WinView
Operating system	English version of: • Windows XP Professional Edition. Service pack SP2 or SP3 • Windows 2003 Server with service pack 2 (SP2) • Windows Vista with service pack 1(SP1)
TankMaster PC Hardware	
Processor	• Windows XP: 2 GHz Intel Pentium double processor • Windows Vista / Windows 2003 Server: 2.5 GHz Intel Pentium double processor
Internal Memory (RAM)	• Windows XP: 2 GB (1 GB for clients) • Windows Vista / Windows 2003 Server: 3 GB
Recommended brand	IBM or DELL PC (Windows XP or Windows Vista approved).
Hard Disk	40 GB (TankMaster + SQL Server 2005 Express needs approximately 600 MB).
Serial Port	RS232, or USB if a FBM2180 fieldbus modem is used
Monitor	A 22 inch or larger monitor is recommended.
Graphics card	1152*864, 65536 colors (16 bit).
Hardware key	One key connected to a USB port for each PC with a TankMaster server. In custody transfer systems a hardware key connected to a parallel port is also required.

NOTE
A hardware key is **not** required to run WinSetUp.

3.3.2 Installed Software Modules

The following software program modules are installed:

- TankMaster WinSetup program
- TankMaster WinOpi program
- Tank Server
- Modbus Master Protocol server
- Various Master Protocol servers
- Various Slave Protocol servers
- Batch server

(1) For previous TankMaster versions other system requirements apply. Please contact Emerson Process Management/Rosemount Tank Gauging for more information.

3.3.3 Installation Procedure

To install the TankMaster software package do the following:

1. Insert the TankMaster CD-ROM. The installation wizard starts automatically and the TankMaster installation CD start-up screen appears:

NOTE!
If the installation wizard does not start automatically when the CD-ROM is inserted, double-click the file Tmcd.exe or click the Windows Start button start, choose Run and select the Tmcd.exe file on the TankMaster installation CD in order to start the TankMaster installation procedure.

2. Click the **Install** button to start the TankMaster software installation procedure. Follow the instructions in the installation wizard.
3. If not available on the PC, install the Acrobat Reader software if you would like to read the online documentation in pdf format.
4. Finish the installation.

Installation Options

There are different installation options available:

Demo	TankMaster in demo mode with demo database.
Client	Client installation only, i.e. no Batch Server, Tank Server or Master Protocol will be installed. Suitable for network clients connected to a common Tank Server or in systems with redundant servers.
Server and Client	Suitable for standalone systems, and for network servers.
Redundant server	Server and client installation with possibility to setup redundant Tank Servers. Note that the redundant Batch Server function has to be manually configured after installation.

3.4 INSTALLING A TANK LEVEL GAUGING SYSTEM

Setting up a Tank Level Gauging system comprises installation and configuration of devices and tanks.

Tank installation

Tank installation includes specifying tank type, specifying transmitters to associate with the tank, and to define which source signals to use as input for various tank measurement variables.

Device installation

Device installation includes tasks such as configuration of field bus communication, specifying tank height and other geometrical parameters, configuration of device specific parameters for radar level gauges, temperature and pressure transmitters.

Wizards

In order to facilitate the installation process, *TankMaster WinSetup* guides you through the installation procedure by using so called “wizards”. *WinSetup* automatically walks through a step-by-step procedure which lets you focus on the important issues rather than trying to remember what to do next. The Online Help provides information for each step in case you need further assistance.

3.5 ILLEGAL CHARACTERS

Naming objects in TankMaster using certain characters may cause TankMaster to malfunction. The following characters should be avoided:

\	Reverse solidus	%	Percent sign
/	Solidus	<	Less-than sign
?	Question mark	>	Greater-than sign
*	Asterisk	{	Left curly bracket
[	Left square bracket	}	Right curly bracket
]	Right square bracket	'	Apostrophe
|	Vertical line	"	Quotation mark

Section 4 The WinSetup Main Window

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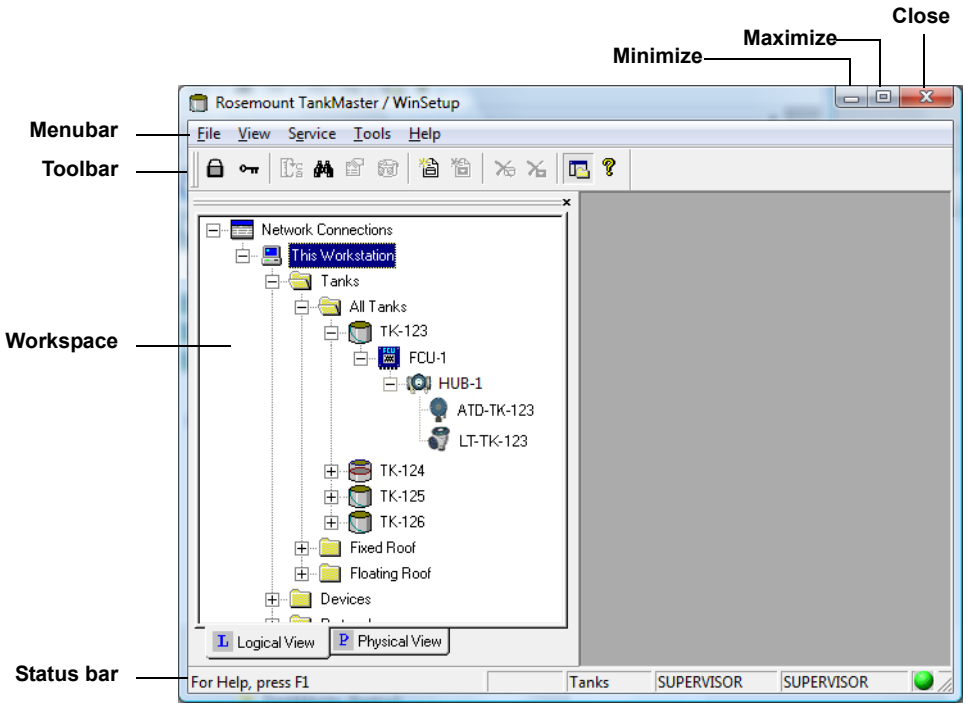
4.4 Workspace - Viewing Tanks and Devices . . . . . page 4-6
4.5 User Management . . . . . page 4-9

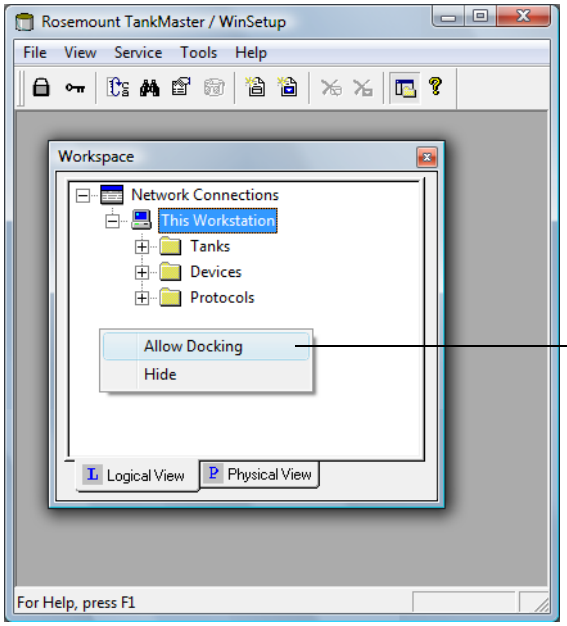
The TankMaster main window includes the *Workspace* to display tanks and devices, a menu bar at the top of the screen, a status bar at the bottom of the screen and a number of buttons in the toolbar.

Figure 4-2. The WinSetup main window



The *Workspace* window can be moved anywhere on the *Main* window. It can be docked to either side of the *Main* window, or it can be left floating.

Figure 4-3. The WinSetup workspace



Right click in the *Workspace* window and choose Allow Docking to place the *Workspace* window along the *Main* window side.

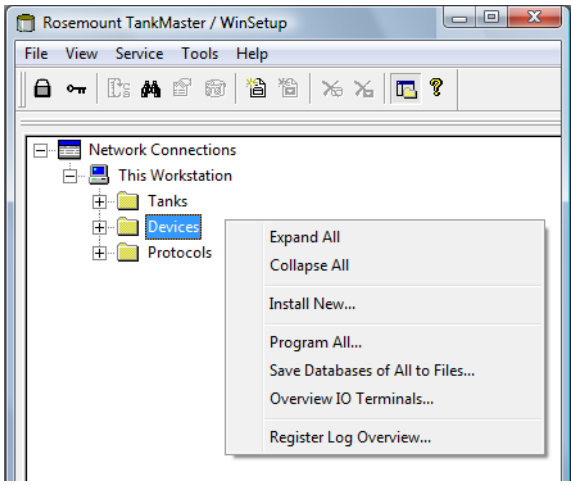
4.1 MENUS

The menu bar at the top of the screen contains menus such as **File**, **View**, **Service**, **Tools**, and **Help.**

Figure 4-4. The WinSetup menu

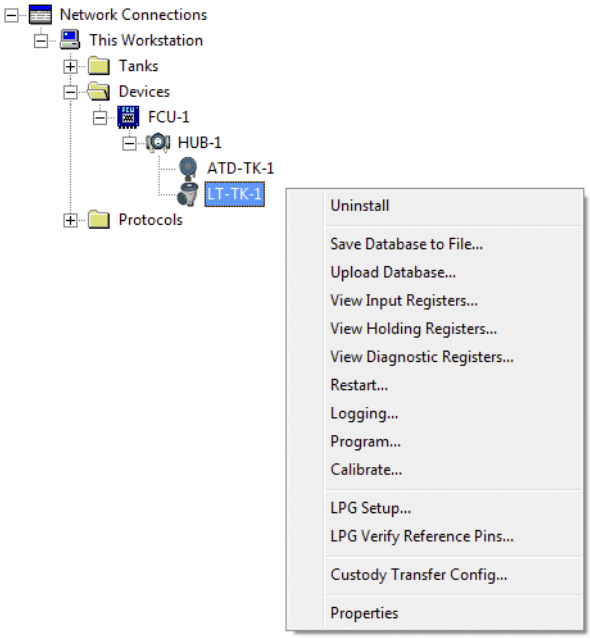
Service menu options are also available by clicking the right mouse button. Different options are available depending on the type of object selected in the *Workspace* window. For example, clicking the right mouse button on the **Devices** folder will open the following menu:

Figure 4-5. The Service menu



Clicking the right mouse button on a device icon brings up a menu with different configuration and service options:

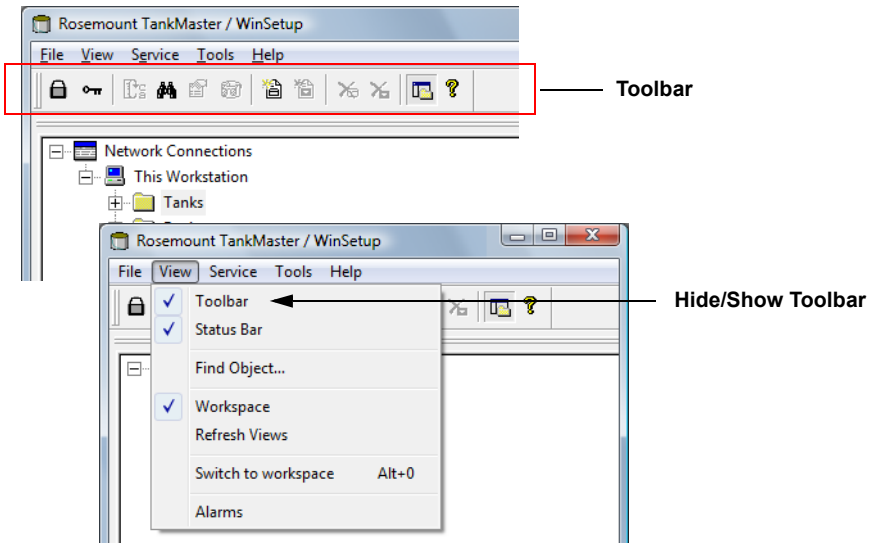
Figure 4-6. The WinSetup menu



4.2 TOOLBAR

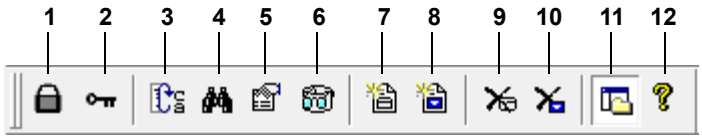
The toolbar provides buttons acting as shortcuts to certain menu options. Normally the Toolbar is visible. To hide it, open the View menu and deselect the Toolbar option:

Figure 4-7. The WinSetup Toolbar



The following items are included in the standard toolbar:

Figure 4-8. Toolbar items



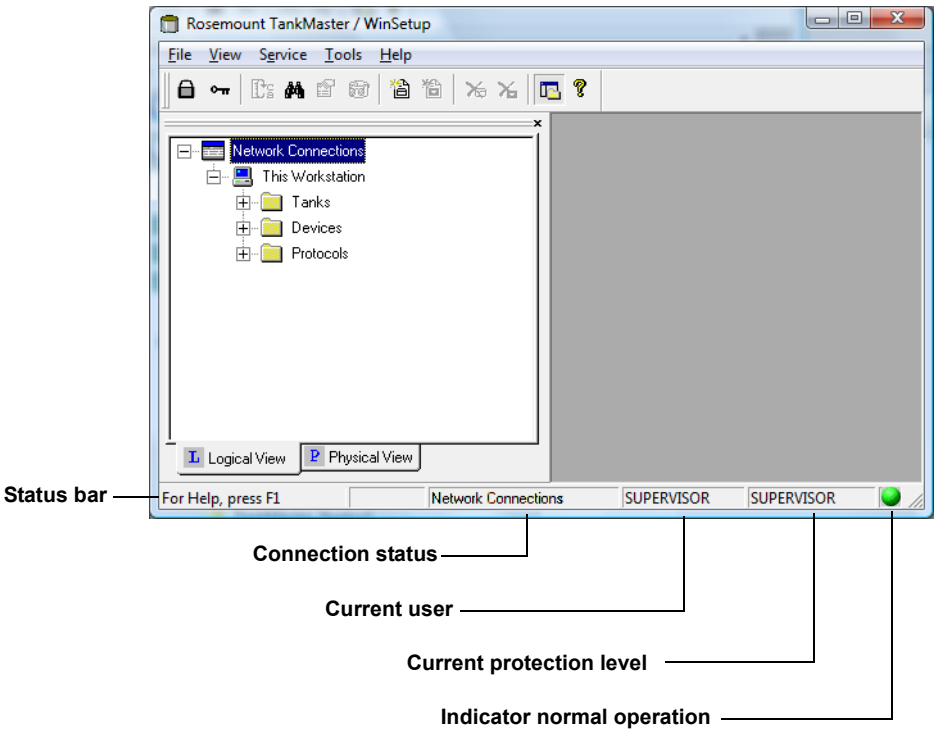
1. Lets you log off to *View Only* mode.
2. Lets you log on to TankMaster as Operator, Supervisor or Administrator.
3. Lets you rename a tank.
4. Lets you search for a tank or a device in the workspace tree structure.
5. Opens the Properties dialog.
6. Opens the *Tank View* window.
7. Lets you install a new tank.
8. Lets you install a new device.
9. Lets you uninstall a tank.
10. Lets you uninstall a device.
11. Lets you turn the *Workspace* window On or Off.
12. About WinSetup

4.3 STATUS BAR

The status bar is located at the bottom of the TankMaster main window. It provides general information about the current system state.

Normally, the TankMaster status bar is visible. To hide it, open the **View** menu and deselect the **Status bar** option.

Figure 4-9. The Winsetup Status bar

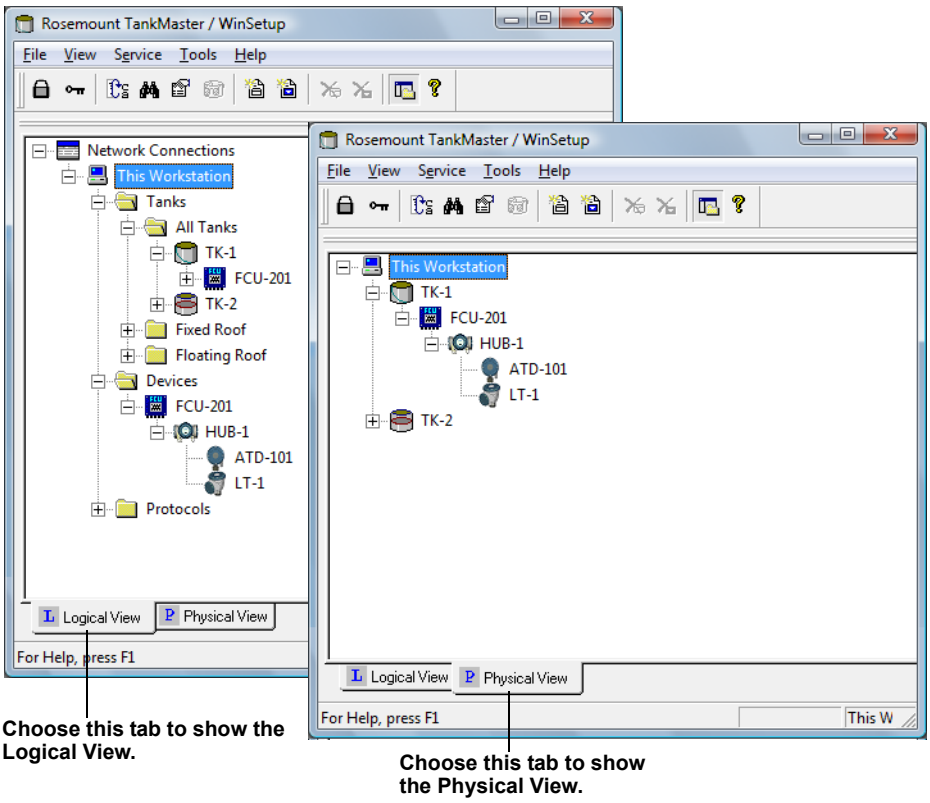


The status bar displays information about a device, tank or any other item that is selected in the *WinSetup* main window. The connection status, current user, current protection level (View Only, Operator etc.) and operation status are also shown.

4.4 WORKSPACE - VIEWING TANKS AND DEVICES

The workspace displays an overview of all devices and tanks. You can switch between two different views: **Logical** and **Physical** view.

Figure 4-10. The Winsetup workspace *Logical* and *Physical* views

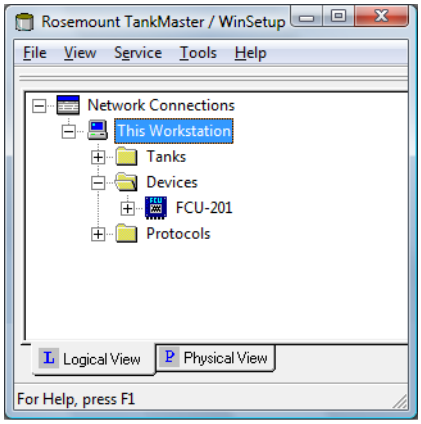


In the workspace you can perform various tasks such as:

- Install and configure tanks, devices, and protocols
- Remove tanks and devices
- Change the configuration of tanks and devices
- View database and input registers
- Setup the tank view layout
- Specify tags for tank and device names
- Upload new application software to a radar tank gauge
- View communication log

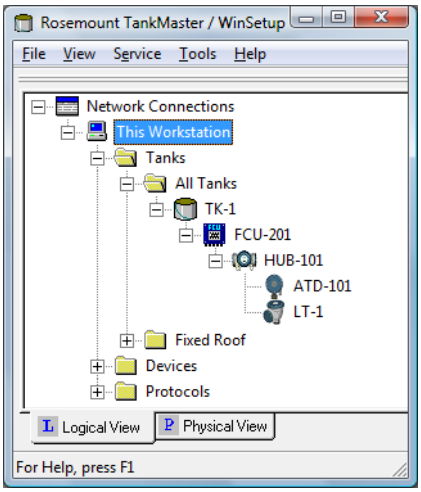
4.4.1 Workspace

The *Workspace* window shows the installed tanks and devices and available communication protocols. It also provides information about the configuration of installed devices.



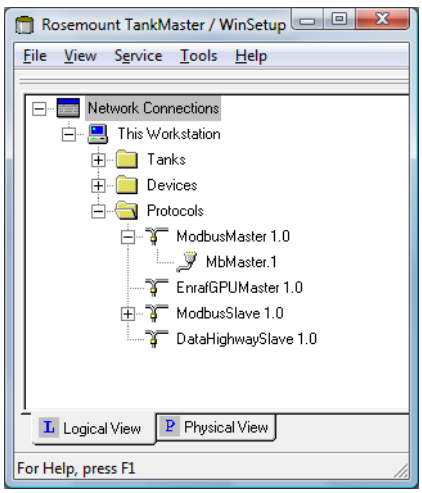
Ex.1 In the Logical View all installed tanks and devices, as well as available communication protocols, are organized in separate folders to provide a clear overview of the system.

A “+”-sign indicates that a device is connected to associated devices.



Ex.2 The *Tanks* folder contains an overview of the installed tanks. For each tank the associated devices are displayed.

The *Workspace* provides information that reflects the system configuration. In this example the symbols indicate that level gauge *LT-1* communicates with *This Workstation* via tank hub *HUB-101* and field communication unit *FCU-201*.



Ex.3 The available communication protocols are displayed in the Protocols folder.

4.4.2 Icons

In the *Workspace* window the different tanks and devices are represented by the following icons:

Rosemount 2410 Tank Hub

Rosemount 2410 Tank Hub (Simulation Mode)

Rosemount 5900S Radar Level Gauge

Rosemount 5400 Series Radar Transmitter

Rosemount 5300 Series Radar Transmitter

ATD (Auxiliary Tank Device; for example Rosemount 2240S, Rosemount 3051S)

Cylindrical tank, HTG fixed roof

Floating roof tank, HTG floating blanket

Spherical tank

Horizontal tank

HTG floating roof tank

Rex Radar Tank Gauge (RTG)

Rosemount 2160/2165/2175 Field Communication Unit (FCU)

Slave Data Acquisition Unit (SDAU)

COM port status

Communication Protocol

Communication Protocol Channel

TRL PU

IOT 51XX

MCG32XX

MDPII

CIU

DS4

4.5 USER MANAGEMENT

TankMaster provides several protection levels allowing you to prevent unauthorized changes. These protection levels are categorized as **User Access Levels** and **User Sub Access Levels**.

The **User Access Levels** are Chief Administrator, Administrator, Supervisor, Operator, and View Only. Each user access level has five **User Sub Access Levels** providing a total of 25 unique access levels.

In order to change tank and device configuration, install new tanks and devices, calibrate a level gauge, change holding register values etc. you have to be logged on to the appropriate TankMaster user access level. See *"To Set Required Access Levels" on page 4-13* for more information.

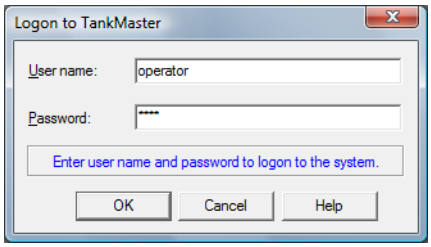
You can be logged on in Chief Administrator, Administrator, Supervisor, Operator, or View Only mode. The default usernames and passwords for the **User Access Levels** are:

Table 4-1. Usernames and passwords for different user access levels

User Access Level	Username Password
View Only	Default username: **view** Default password: **view**
Operator	Default username: **operator** Default password: **oper**
Supervisor	Default username: **supervisor** Default password: **super**
Administrator	Default username: **administrator** Default password: **admin**
ChiefAdministrator	Default username: **chiefadmin** Default password: **chief**

4.5.1 Logging On to TankMaster

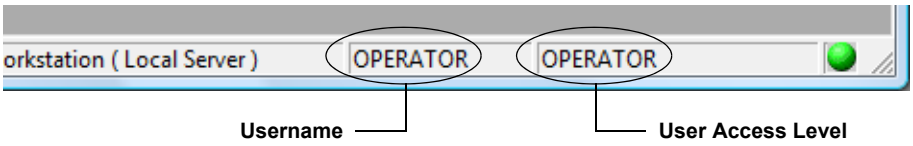
1. From the **File** menu choose **Log On** or click the Log On button in the WinSetup toolbar.



2. Type your Username and Password. The password is case sensitive but the username is not.

NOTE!
If logging on fails five consecutive times the user account is disabled. In this case the user account has to be enabled by an administrator.

3. Click the **OK** button.
   The currently logged on user and the corresponding protection level is displayed in the *WinSetup* status bar.

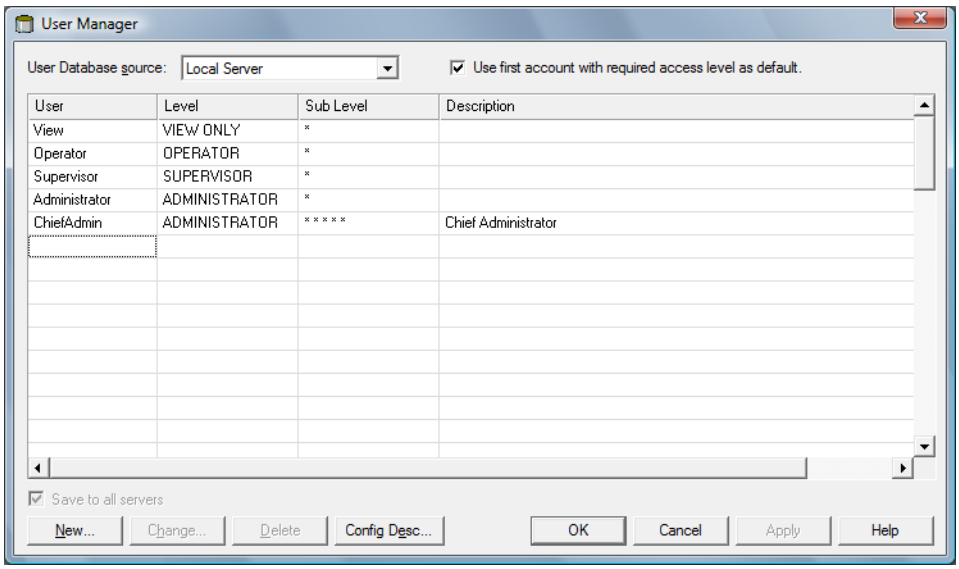


4.5.2 To Administrate User Accounts

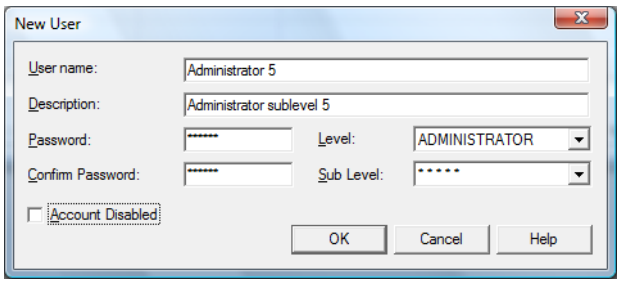
TankMaster allows you to setup a number of users at different levels and sub levels. You must be logged on as an Administrator in order to add new user accounts or to change the existing user account settings.

To add a new user:

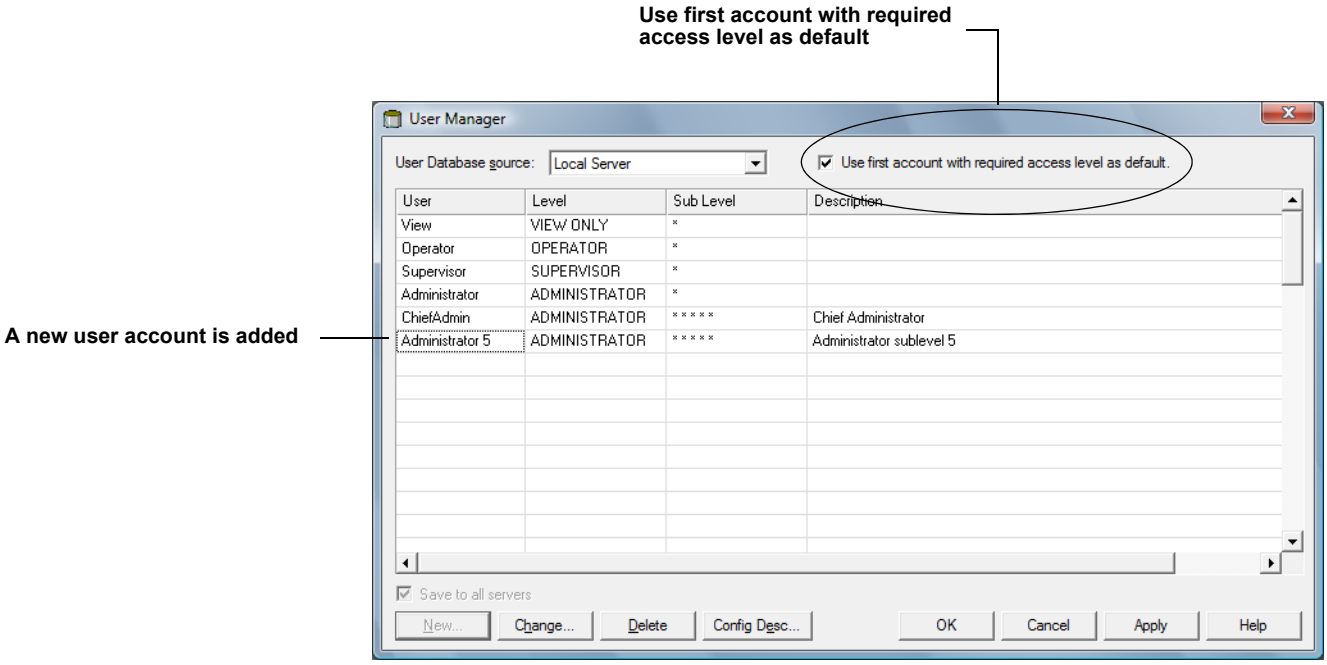
1. Log on as an Administrator.
2. From the **Tools>Administrative Tools** menu choose **User Manager**.



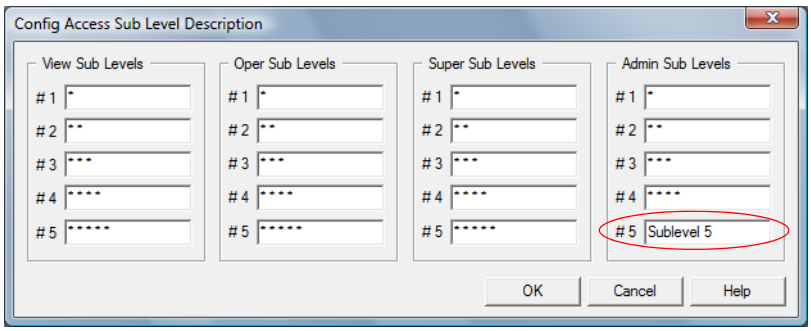
3. In the *User Manager* window select a cell in an empty row and click the **New** button.



4. Type a user name and a password. If you like, enter a description in the Description field.
5. Choose the desired **User Access Level** and **Sub Level** and click the **OK** button. See *"User Management" on page 4-9* for further information on the available User Access Levels and Sub Levels.



6. Check that the new user appears in the *User Manager* window. Select the “Use first account...” box if you want a default user name to appear in the Log On dialog whenever it is opened. If this box is unmarked the User Name field is empty when the Log On dialog opens.
7. To configure the access sub level descriptions, click the **Config Desc** button and enter new descriptions in the various fields.



8. Click the **OK** button.

4.5.3 To Set Required Access Levels

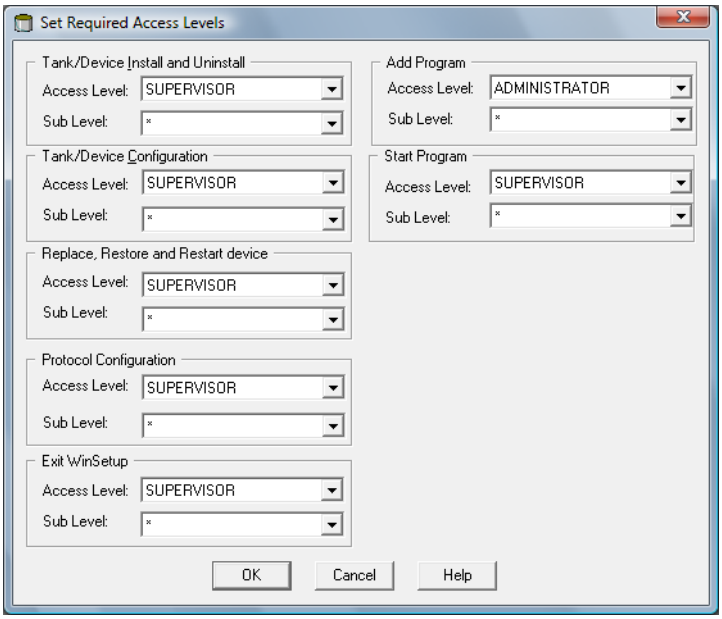
In TankMaster WinSetup, you can set the access level required for the following actions:

- Tank/Device Install and Uninstall
- Tank/Device Configuration
- Replace, Restore and Restart Device
- Protocol Configuration
- Exit WinSetup
- Add Program (see *"Customizing the Tools Menu in WinSetup" on page 7-2*)
- Start Program (in the Tools menu)

For example, if you are logged on as an Operator (* * * * *), you are not allowed to exit *WinSetup* if the required exit level for this action is set to Supervisor (*) or higher.

To set the required access levels:

1. From the **Tools/Administrative Tools** menu choose **Set Required Access Levels**.



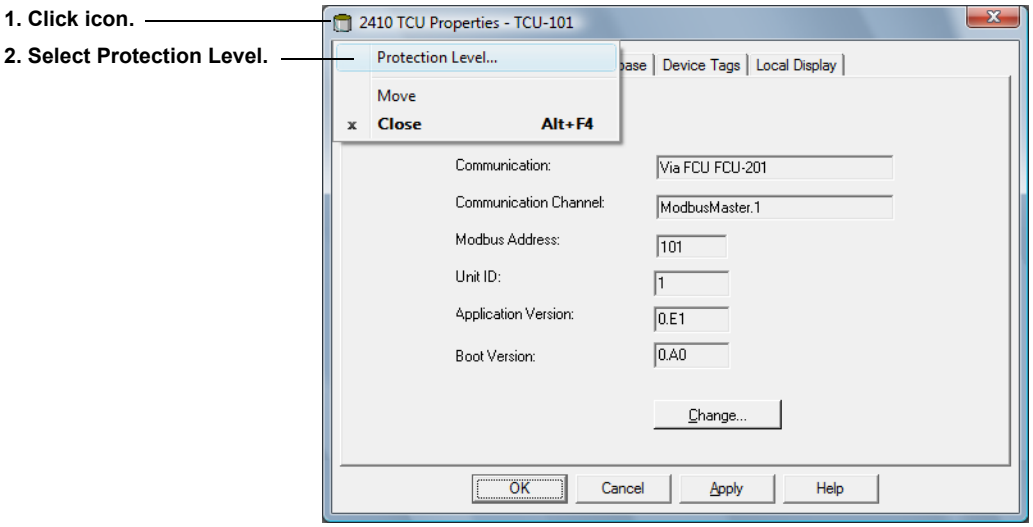
NOTE!
You have to be logged on as an Administrator (* * * * *) to be able to set the required access levels. To create an Administrator (* * * * *) account, see *"To Administrate User Accounts" on page 4-11*.

2. Set the required access levels for each type of action and click the **OK** button.

4.5.4 To Change Protection Level of Separate Windows

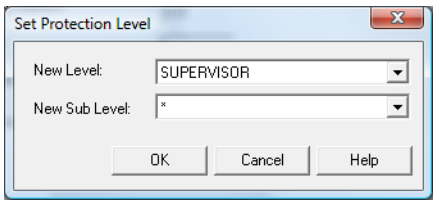
In TankMaster it is possible to set a **Protection Level** for a specific window, e.g. the *Properties* window for a Rosemount 5900S Radar Level Gauge. This function is only available if you are logged on at the Administrator (* * * * *) level. To change the protection level do the following:

1. Put the cursor on the icon at the upper left corner and click the left mouse button.



2. Choose the **Protection Level...** option.

NOTE!
You have to be logged on as an Administrator (* * * * *) to be able to change the Protection Level. To create an Administrator (* * * * *) account, see *"To Administrate User Accounts" on page 4-11*.

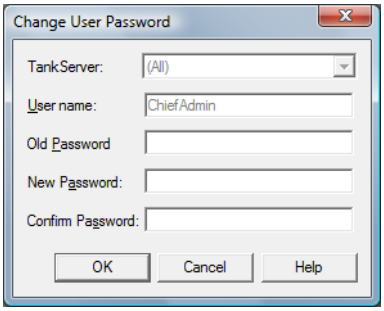


3. Select the desired protection level from the drop down menus and click the **OK** button. Now changes in this window can only be performed if you are logged on at the specified Protection Level or higher.

4.5.5 To Change Password

TankMaster allows you to change your password at any time:

1. From the **Tools/Administrative Tools** menu choose the **Set Password** option.



2. Select the TankServer on which your user account is valid. You can see the different servers in the *WinSetup* workspace window. (If you are logged on, the current server is already selected in the *Change User Password* window).
3. Enter your username if the workspace is in View Only mode. If you are already logged on, your username appears in the Username field.
4. Enter the old password and the new password in the corresponding fields.

NOTE!
The password is case sensitive.

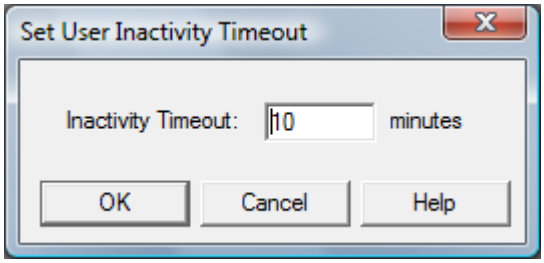
5. Confirm the new password and click the **OK** button.

4.5.6 To Change Inactivity Timeout

TankMaster WinSetup includes the option to set a timeout after which the current user is automatically logged off. The timeout period is reset each time the user performs an activity that requires an access level check, for example changing the configuration of a device or logging on to *WinSetup*.

To set the Inactivity Timeout:

1. From the **Tools/Administrative Tools** menu choose the **Set Inactivity Timeout** option (you have to be logged on as Administrator).



2. Type the desired value in the corresponding input field.
3. Click the **OK** button.

Section 5 Installing a Raptor Level Gauging System

5.1 System Configuration Overview . . . . . page 5-2
5.2 Communication Protocol Setup . . . . . page 5-6
5.3 Preferences . . . . . page 5-16
5.4 Field Device Installation - Overview . . . . . page 5-24
5.5 Installing a Rosemount 2160 FCU . . . . . page 5-25
5.6 Installing a Rosemount 2410 Tank Hub . . . . . page 5-38
5.7 Installing a Rosemount 5900S Radar Level Gauge page 5-51
5.8 Installing Auxiliary Tank Devices . . . . . page 5-65
5.9 Installing a Rosemount 5400 . . . . . page 5-78
5.10 Installing a Rosemount 5300 . . . . . page 5-90
5.11 Installing a Tank . . . . . page 5-101
5.12 Adding a Tank to a Raptor System . . . . . page 5-114
5.13 Level Gauge Calibration . . . . . page 5-122
5.14 Tank Capacity . . . . . page 5-124
5.15 Tank Entry . . . . . page 5-125
5.16 Setting up a Hybrid System . . . . . page 5-126

5.1 SYSTEM CONFIGURATION OVERVIEW

5.1.1 Preparations

Before installing a Rosemount Tank Gauging system you should ensure that the following information is available:

- A plan of all field devices and tanks.
- Unit IDs of each device (Unit ID is a unique identifier given to each Raptor device at factory).
- Modbus addresses of level devices and ATD devices. The Raptor devices are shipped with default addresses which will be changed at system configuration. The Modbus addresses are configured in the **Slave Database** of the 2160 FCU and the **Tank Database** of the 2410 Tank Hub as described below.
- Tank geometry parameters and reference distances such as tank reference height (R) and distance between Zero level (datum plate) and tank bottom.
- Antenna types used for the various level gauges.

5.1.2 Installation Procedure

Installation and configuration of a Rosemount Raptor level gauging system includes the following steps as briefly described below:

1 Communication Protocol Setup

Specify communication protocol parameters:

- The Modbus Master Protocol handles communication between a TankMaster work station and field devices such as the Rosemount 2160 Field Communication Unit and the Rosemount 2410 Tank Hub.
- The Slave Protocol handles communication with a host computer.
- Communication with TankMaster can be supervised by logging various error types and function codes.

2 Preferences

Specify measurement units, tag prefixes for tank and device labels, inventory parameters, and parameters to be displayed when viewing tank data.

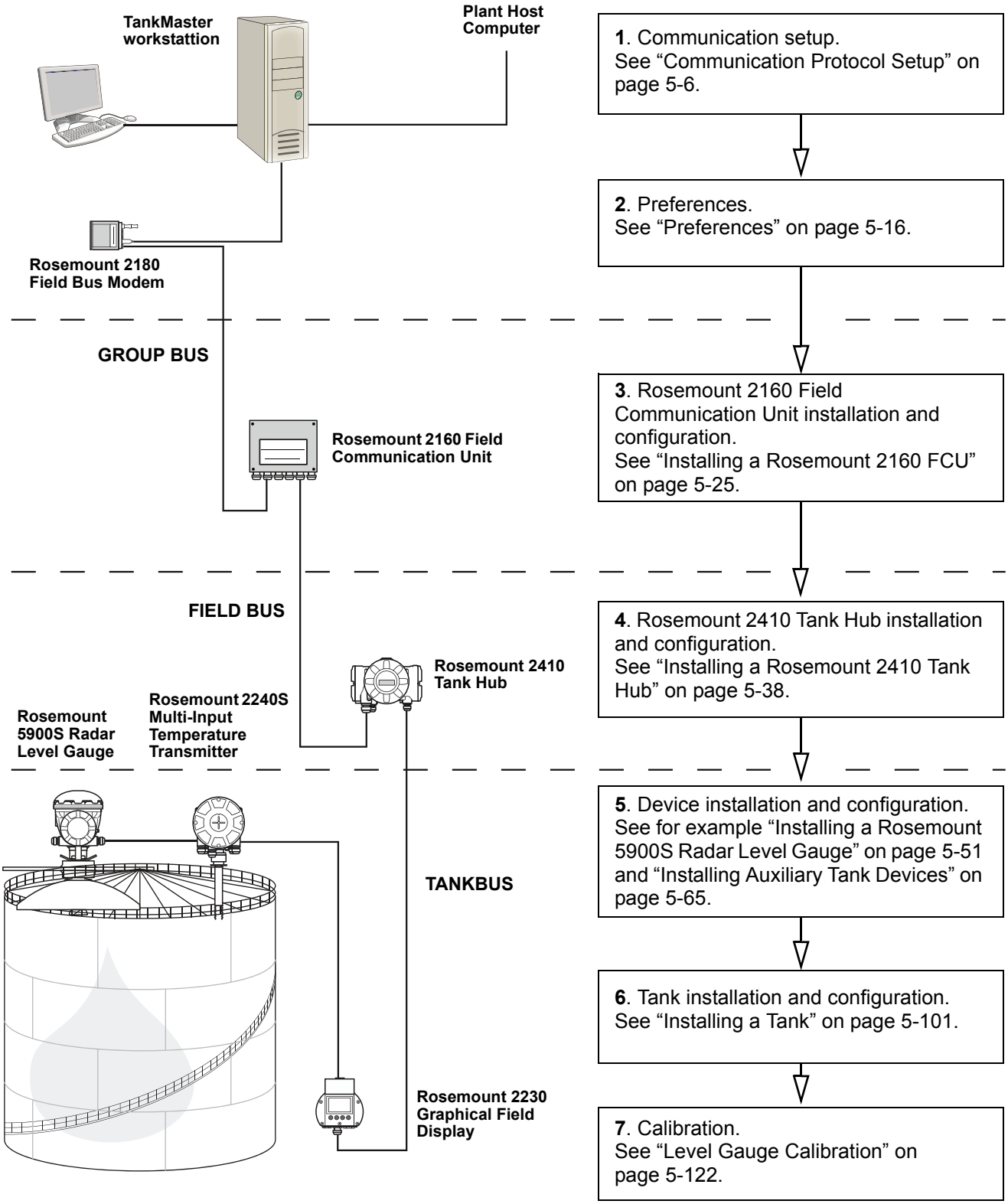
3 Installation and Configuration of 2160 Field Communication Unit

The Rosemount 2160 Field Communication Unit (FCU) has to be installed and configured prior to installing other devices such as a Rosemount 2410 Tank Hub and a Rosemount 5900S Radar Level Gauge.

To install a Rosemount 2160 FCU:

- Assign a Modbus communication address
- For each communication port, configure protocol and appropriate communication parameters
- Configure the Slave Database with information about the devices connected to the fieldbus

Figure 5-1. Raptor system installation procedure



4 Installation and Configuration of Rosemount 2410 Tank Hub

The Rosemount 2410 should be installed after the Rosemount 2160 Field Communication Unit. In case the Rosemount 2410 is connected directly to a TankMaster work station without a 2160 FCU, the 2410 has to be installed before the other field devices. To install a 2410 do the following:

- Specify a device tag
- Assign a Modbus communication address
- Configure the 2410 Tank Database which maps devices to tanks
- Configure the optional local display

5 Installation and Configuration of Field Devices

When setting up a Raptor level gauging system the field devices, such as level gauges and temperature transmitters, are installed in TankMaster Winsetup as part of the Rosemount 2410 installation procedure. The devices are configured at a later stage by using the *Properties* window of each device.

Installation and configuration of devices include the following steps:

Communication	Specify protocol and address.
Configuration	Specify tank geometry parameters, device specific parameters, temperature element positions, and other parameters depending on the device type.

6 Installation and Configuration of Tanks

Installing a tank includes the following steps:

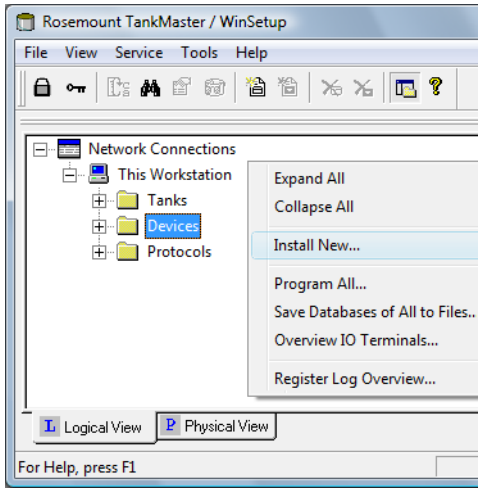
Choose tank type	Select one of the available options such as Fixed Roof, Floating Roof, Sphere LPG, Horizontal LPG, or other suitable tank type.
Specify a tank tag	Specify a name to be used as an identifier in the *Workspace* window and other TankMaster windows.
Select devices	Associate devices to the tank.
Configuration	Specify the available source signals for parameters such as Free Water Level, Vapor Pressure and Liquid Pressure.
Value Entry	Specify an approved value range for each measurement variable. In case there is no source instrument available for a certain parameter, you can specify manual values to be used instead.

7 Calibration

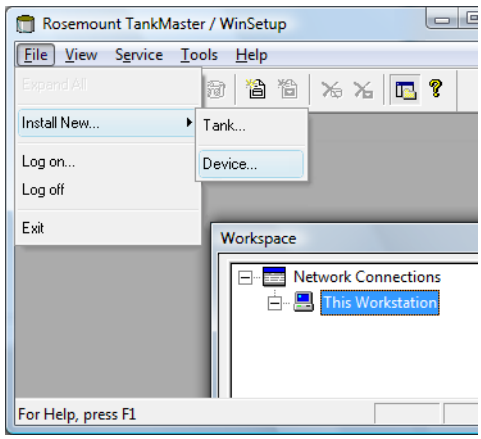
When a Rosemount 5900S Radar Level Gauge is installed and configured the Calibration Distance may have to be adjusted in order to match measured level and actual product level. The adjustment should be performed once at the final commissioning.

5.1.3 Using the Device Installation Wizard

The device installation wizard guides you step-by-step through the installation procedure. The wizard can be started in different ways:



1. Select the **Devices** folder.
2. Click the right mouse button and choose **Install New** from the popup menu, or from the **Service>Devices** menu choose **Install New**.



As an alternative you can use the following method:

1. Select the server where your system is installed.
2. From the **File>Install New** menu choose **Device**.

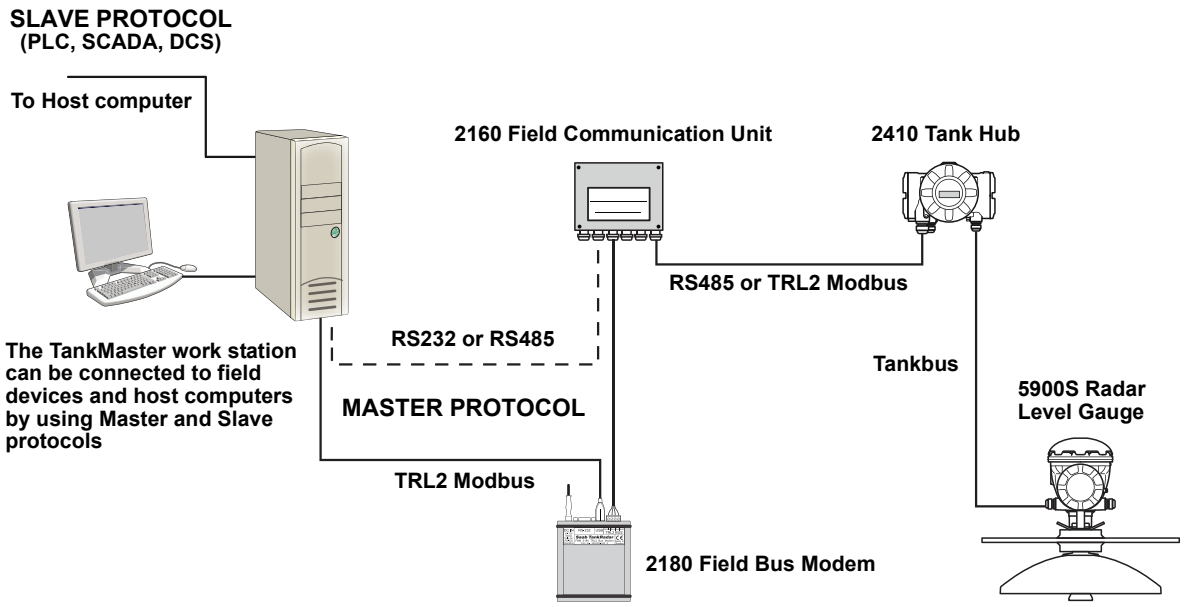
See chapter 5.6 to 5.10 for detailed information on how to install different devices.

5.2 COMMUNICATION PROTOCOL SETUP

The TRL2 Modbus Master protocol is available as default protocol when Rosemount TankMaster is installed on a TankMaster work station. Other protocols, such as the Modbus Slave protocol for communication with host systems, can be obtained as option. Contact Emerson Process Management / Rosemount Tank Gauging for more information.

A protocol offers up to eight channels. For each channel you can specify which PC communication port (USB/COM) to connect to, as well as standard communication parameters such as Baud Rate and number of Stop Bits.

Figure 5-2. Communication with various Raptor devices



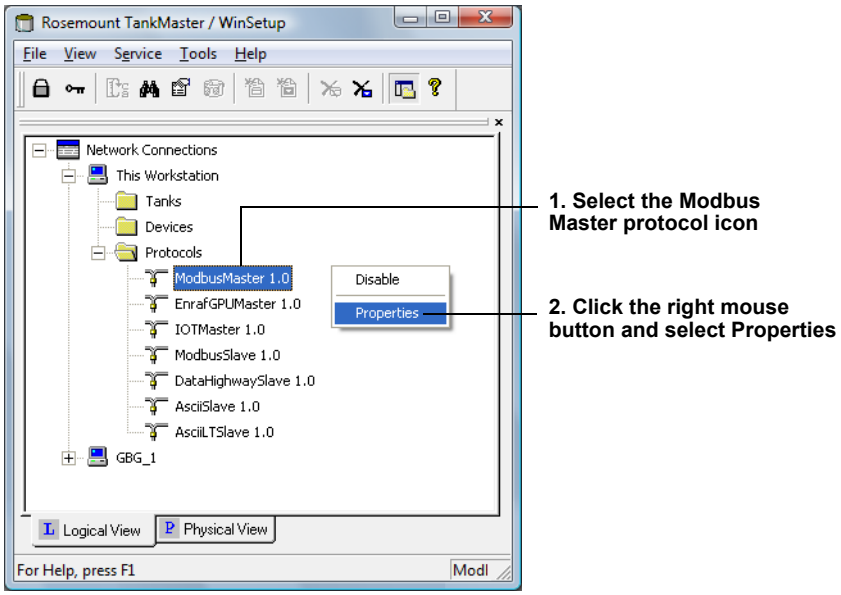
For each protocol you can configure the following:

- Communication parameters: COM Port, Baud rate, number of stop bits, modem type, etc.
- Log file: File name, file size, log schedule.
- Tank mapping (for slave protocols only)

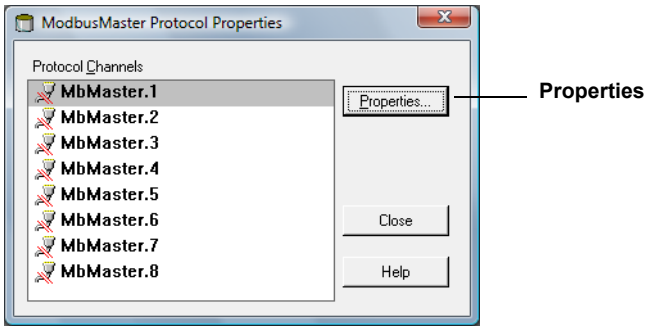
5.2.1 Master Protocol Channel Configuration

To configure a communication protocol do the following:

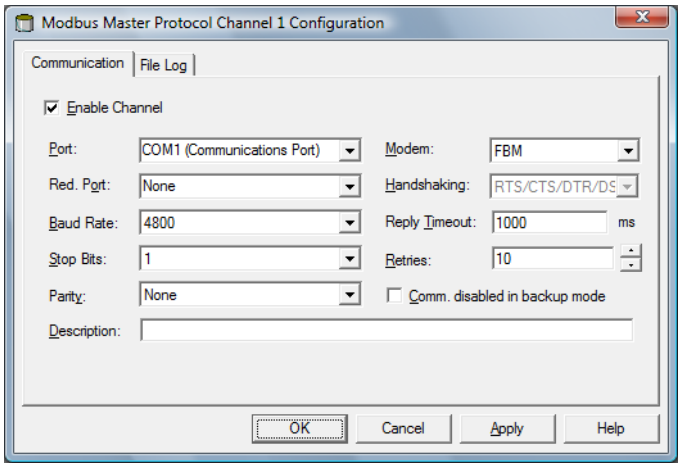
1. Open the **Protocols** folder in the *Workspace* window.
2. Select the icon that corresponds to the particular protocol to be configured (this example will show the Modbus Master protocol).



3. Click the right mouse button and select **Properties**, or choose **Protocols/Properties** from the **Service** menu.



4. The *Protocol Properties* window lists an overview of protocol channels. For each channel the corresponding icon indicates whether the channel is enabled or disabled.
5. Select the desired channel.
6. Click the **Properties** button to configure the protocol channel.



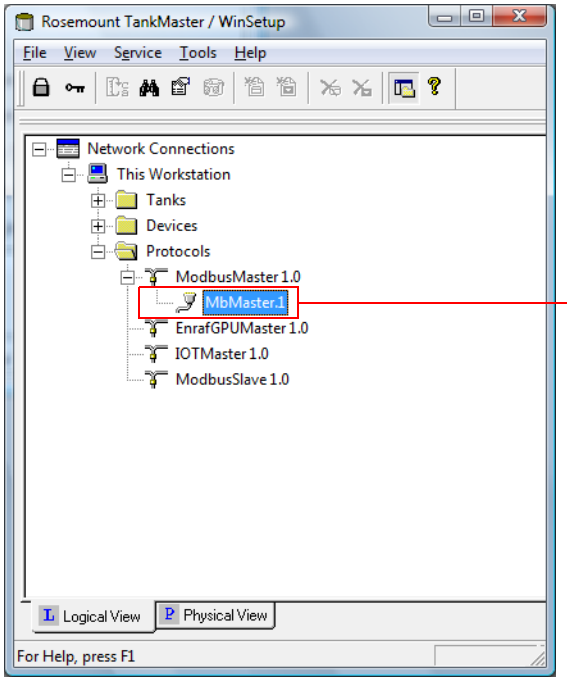
7. Select the *Communication* tab.
   Parameters that control the communication between a TankMaster work station and the field devices are configured in the *Communication* tab. You can specify the type of information to be logged and saved to disk in the *File Log* tab (see also *"Log File Configuration" on page 5-14*).

8. Set the communication parameters:

Port	The COM port that the Rosemount 2180 will be connected to
Baud rate	4800
Stop bits	1
Parity	None
Modem	Choose FBM for the Rosemount 2180 Field Bus Modem
Handshaking	FBM: RTS/CTS/DTR/DSR RS485: RTS/CTS RS232: None
Reply timeout	1000 ms
Retries	10
Description	Text describing the configured channel

NOTE!
If the communication is interrupted and handshaking includes DSR, no query will be sent from the TankMaster Protocol Server. This may result in a Query Timeout.

9. The **Comm. disabled in backup mode** check box can be used for systems with redundant tank servers. If the check box is selected, the ModbusMaster will not send any queries if the local tank server is in backup mode.
10. Select the **Enable Channel** check box to activate the protocol channel.
11. Click the **OK** button to store the current configuration and close the configuration window.
12. The Modbus Master Channel icon (channel no. 1 in this example) appears in the WinSetup workspace:


Rosemount TankMaster / WinSetup
File View Service Tools Help
Network Connections
This Workstation
Tanks
Devices
Protocols
ModbusMaster 1.0
MbMaster.1
EnrafGPUMaster 1.0
IOTMaster 1.0
ModbusSlave 1.0
Logical View
Physical View
For Help, press F1
Modbus Master channel 1 is enabled

5.2.2 Slave Protocol Channel Configuration

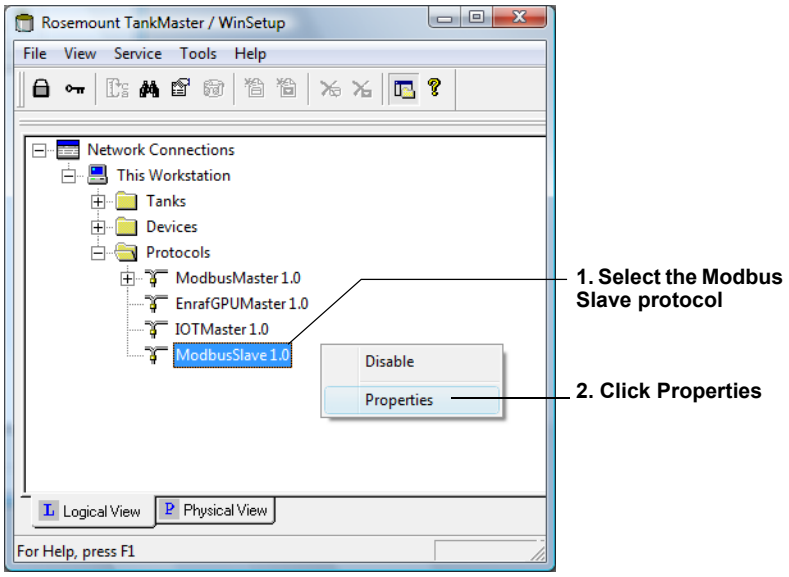
A Slave protocol allows you to collect data from the TankMaster workstation to a host computer.

NOTE!
A hardware key must be installed in order to run a slave protocol server.

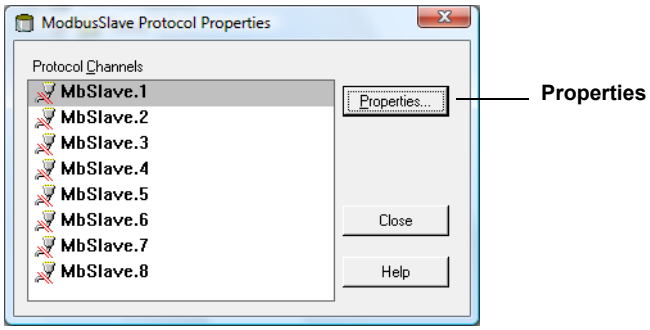
TRL2 Modbus Communication Setup

To configure the TRL2 Modbus Slave protocol channel do the following:

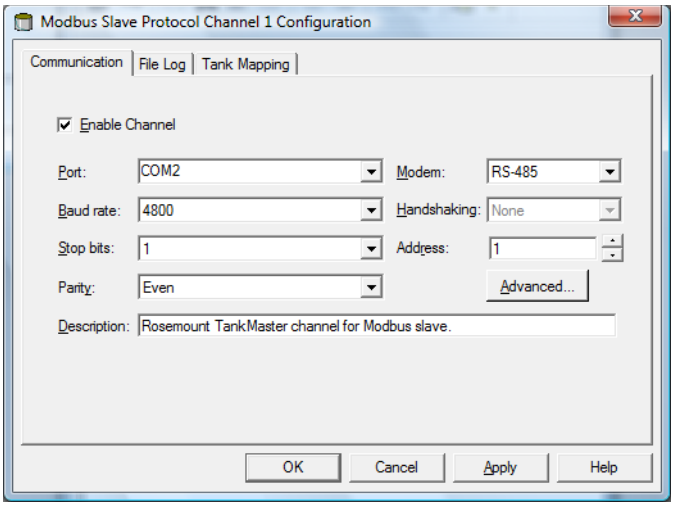
1. Open the **Protocols** folder in the *Workspace* window.
2. Select the ModbusSlave protocol icon.



3. Click the right mouse button and select **Properties**, or choose **Protocols>Properties** from the **Service** menu.



4. The *Protocol Properties* window lists enabled and disabled protocol channels.
5. Select the desired channel.
6. Click the **Properties** button to configure the protocol channel.



7. Select the *Communication* tab.
8. Select the **Enable Channel** check box to activate the protocol channel.
9. Ensure that the following communication parameters are set:

Port	Choose the COM port that the host computer will be connected to.
Baud rate	Choose a setting that matches the host setting.
Stop bits	Choose a setting that matches the host setting.
Parity	Choose a setting that matches the host setting.
Modem	Choose the appropriate interface. Select FBM if you are using a Rosemount 2180 Field Bus Modem.
Handshaking	FBM: RTS/CTS/DTR/DSR. RS485: RTS/CTS. RS232: See the specifications for the communication software used on the host system.
Address	Set the address to be used by the host computer to identify the TankMaster workstation.
Description	Text that describes the configured channel.

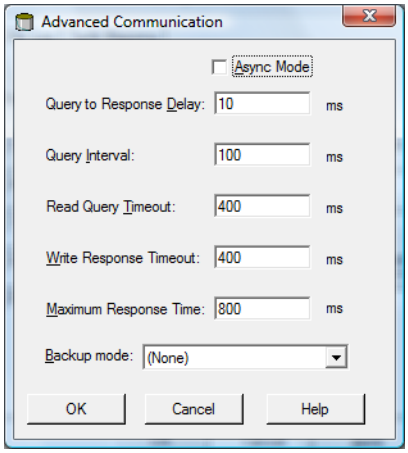
NOTE!
If handshaking includes DSR, no query will be sent from the TankMaster Protocol Server if the communication is interrupted. This may result in a Query Timeout.

10. Click the **OK** button to store the current configuration and close the configuration window.

Advanced Configuration

To configure delay times and time-outs perform the following steps:

1. In the *Slave Protocol Channel Configuration* window, select the *Communication* tab and click the **Advanced** button:



2. The following default values are used for the TRL2 Modbus Slave protocol:

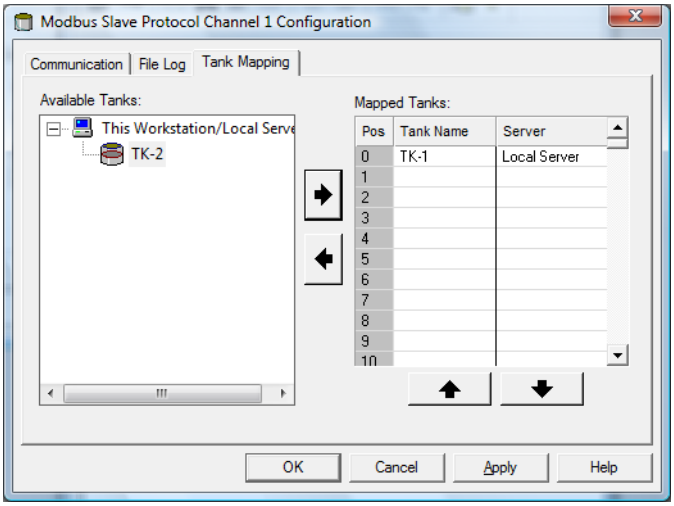
Query to Response Delay	10 ms
Query interval	100 ms
Read Query Timeout	400 ms
Write Response Timeout	400 ms
Max. Response Time	800 ms
Backup Mode	None

3. The **Async Mode** check box can be used to enable the async mode. The Async Mode is used to improve communication when the system communicates with many Com ports.
4. Choose one of the following three options for **Backup Mode**:
   - None
   - *Write Commands Rejected* means that TankMaster does not accept any write commands from the host system to device database registers
   - In *Silent* mode the ModbusSlave protocol will not send any replies to requests coming from the host computer while the local tankserver is in backup mode

Tank mapping configuration

The slave protocol allows you to send data from a Rosemount Tank Gauging system to a host computer. In the *Tank Mapping* window you can specify from which tanks to collect data for the host system:

1. In the *Slave Protocol Channel Configuration* window, select the *Tank Mapping* tab:



2. From the list of tanks that appear in the **Available Tanks** pane, select the tanks that the host will connect to.
3. Click the button to move the selected tanks to the list of **Mapped Tanks**.
   Ensure that the tanks appear in the order required by the host system. When the host sends a query, TankMaster responds by sending tank data in the order as the tanks are listed in the **Mapped Tanks** column. You can easily change the position of mapped tanks by using the and buttons.
4. Click the **OK** button to save the current configuration and close the window.

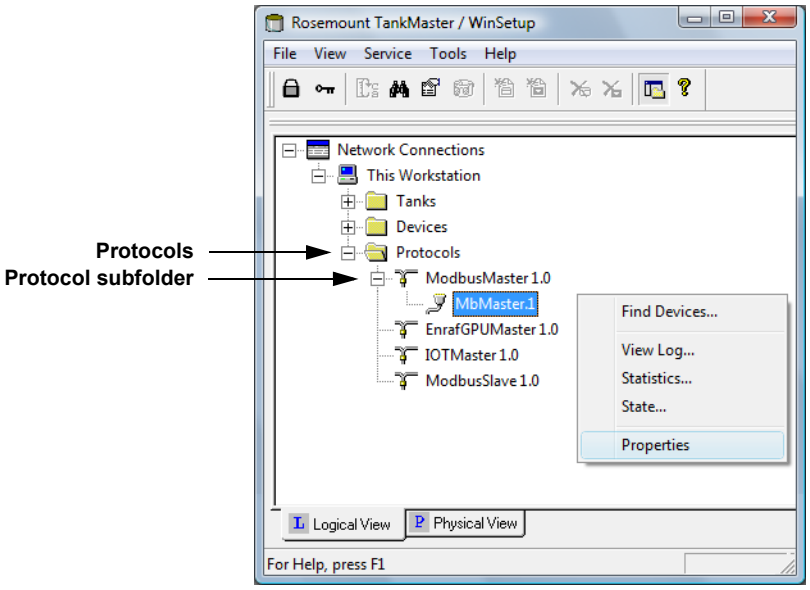
5.2.3 Log File Configuration

See chapter “Saving the Communication Log to File” on page 7-39 for information on how to store a communication log on disk.

5.2.4 Changing the current Protocol Channel Configuration

The channel configuration can be changed at any time. Do the following:

1. In the WinSetup Workspace open the **Protocols** folder and the protocol subfolder with the enabled channels.



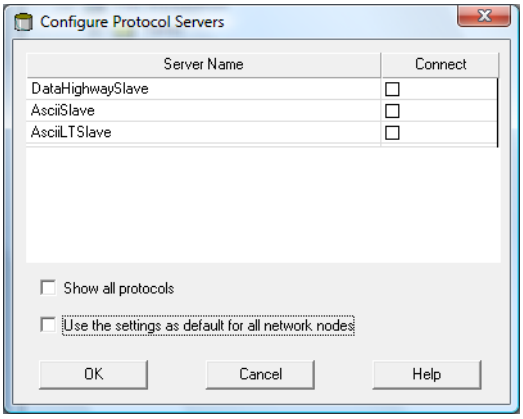
2. Select the channel icon.
3. Click the right mouse button and choose **Properties**, or from the **Service** menu choose **Channels>Properties**.
4. Choose the appropriate tab and change the protocol settings as described in the previous sections.

5.2.5 Protocol Server Configuration

You can specify which protocol servers that will be connected when starting TankMaster WinSetup.

To change the current configuration do the following:

1. In the WinSetup workspace select the **Protocols** folder.
2. Click the right mouse button and choose **Configure**.



3. In the **Connect** column, select the check box of each protocol to be automatically connected when WinSetup starts up.

You may disable a protocol server at any time by using the Disable command:

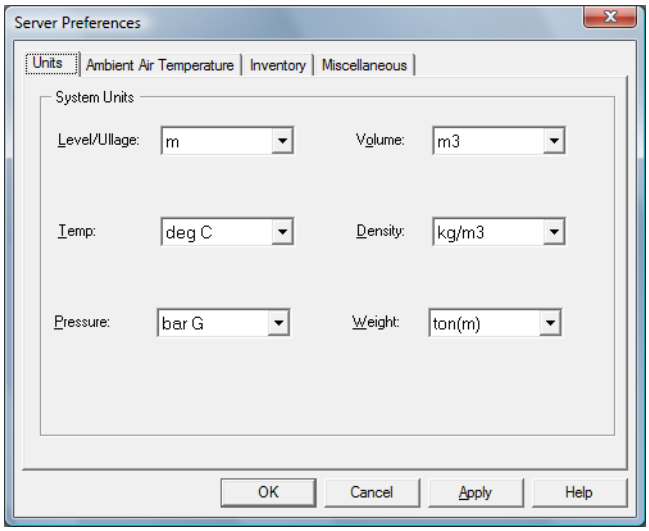
1. In the Winsetup workspace, open the Protocols folder.
2. Click the right mouse button on the protocol server icon and choose Disable.

5.3 PREFERENCES

5.3.1 Measurement Units

Specify units for inventory calculations and measured variables such as level and temperature. To change measurement units do the following:

1. Select the desired server (e.g. “This Workstation”) in the *WinSetup* workspace.
2. Click the right mouse button and choose **Setup**, or from the **Service** menu choose **Servers>Setup**.
3. In the *Server Preferences* window select the *Units* tab.



4. Choose the desired measurement units for level/ullage, temperature, pressure, volume, density, and weight.
5. Click the **OK** button to save the current setting and close the window.

NOTE!
Make sure that the desired measuring units are specified before installing new tanks and devices.

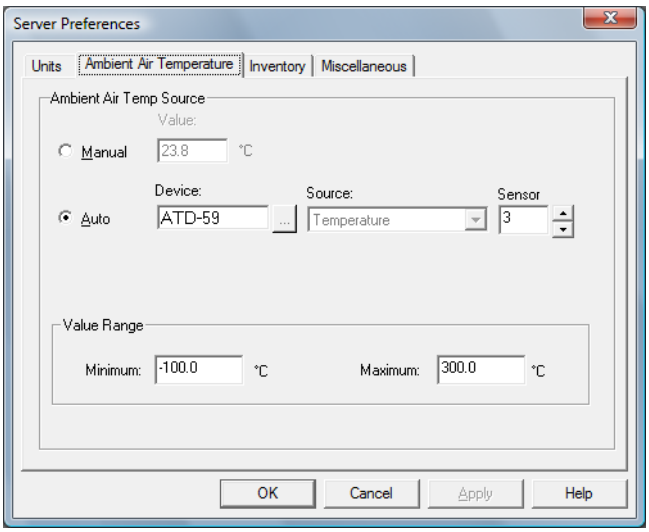
Note that these settings only affect installation of new tanks. Tanks which are already installed in the *WinSetup Workspace* will not be affected. In order to change measurement units for an existing tank you have to do the following:

1. Uninstall the tank.
2. Change measurement units in the *Server Preferences/Units* window (or in the TankMaster WinOpi program choose menu option Setup>System and change units in the *System Setup* window).
3. Install the tank again.

5.3.2 Ambient Air Temperature

To change the Ambient Air Temperature preferences do the following:

1. Select the desired server (e.g. “This Workstation”) in the *WinSetup* workspace.
2. Click the right mouse button and choose **Setup**, or from the **Service** menu choose **Servers>Setup**.
3. In the *Server Preferences* window select the *Ambient Air Temperature* tab:

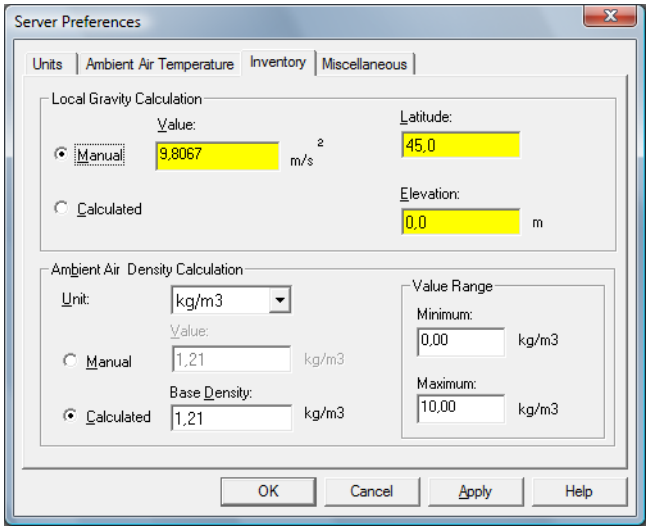


4. Choose **Auto** when there is a temperature sensor available that can be used for Ambient Air Temperature measurements. Otherwise, select the **Manual** option and type a value for the Ambient Air temperature.
   - **Device**. Click the ... button and select the device to which a temperature sensor is connected.
   - **Ambient Air Temp Source**. Select temperature source associated with the selected device. In a Raptor system the associated temperature transmitter has to be configured in the tank database of the 2410 Tank Hub (see “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information).
   - **Sensor**. Choose the specific sensor to be used for Ambient Air Temperature.
   - **Value Range**. The Value Range defines the minimum and maximum values when Ambient Air Temperature is manually entered.
5. Click the **OK** button to save the current setting and close the window.

5.3.3 Inventory

Local Gravity and Ambient Air Density calculations are used for automatic density measurements. To change the Inventory settings do the following:

1. Select the desired server (e.g. “This Workstation”) in the *WinSetup* workspace.
2. Click the right mouse button and choose **Setup**, or from the **Service** menu choose **Servers>Setup**.
3. In the *Sever Preferences* window select the *Inventory* tab:

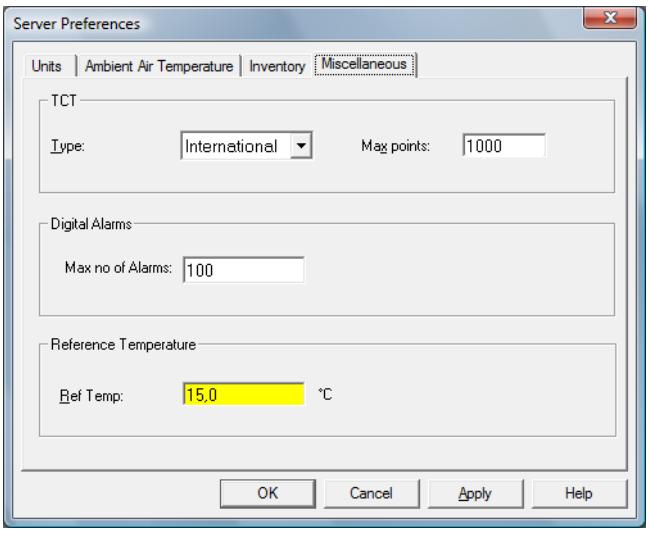


4. Local Gravity.
   The Local Gravity is used for density and weight calculations when an optional pressure transmitter is installed.
   Select **Manual** if you want to specify the Local Gravity.
   Choose **Calculated** if you want the local gravity to be calculated by TankMaster. In this case you need to enter the Latitude and Elevation of the site.
5. Ambient Air Density.
   The Ambient Air Density is used for calculating **Observed Density** and **Weight in Air** (WIA).
   Select **Manual** if you want to use a specific Ambient Air Density value.
   Choose **Calculated** if you want the Ambient Air Density to be calculated by TankMaster. The calculated value is based on the **Base Density** and the Ambient Air Temperature.
   See the *TankMaster WinOpi Reference Manual (Document no. 303028EN)* for more information on inventory parameters and calculations.
6. Click the **OK** button to save the current settings and close the window.

5.3.4 Miscellaneous

To change parameters such as type of Tank Capacity Table, or Reference Temperature, do the following:

1. Select the desired server (e.g. “This Workstation”) in the *WinSetup* workspace.
2. Click the right mouse button and choose **Setup**, or from the **Service** menu choose **Servers>Setup**.
3. In the *Server Preferences* window select the *Miscellaneous* tab.



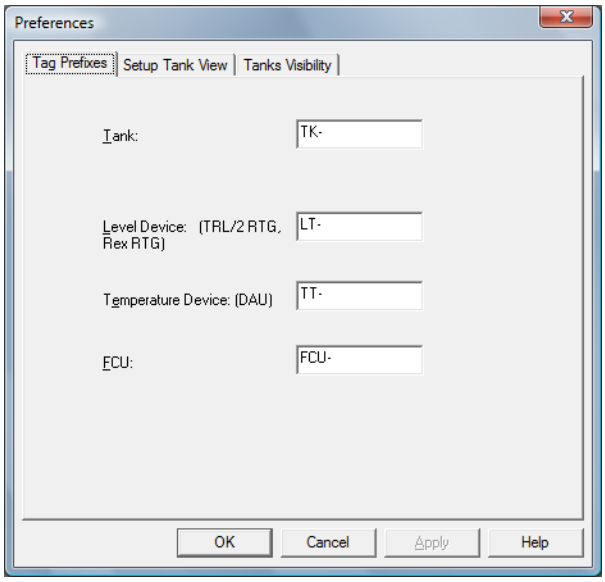
4. Choose a type of Tank Capacity Table (TCT) to be used as default setting when installing new tanks. The default TCT type will automatically be chosen when **strapping tables** are created for new tanks. However, the TCT type can be changed when the strapping table is specified in the *Tank Capacity Setup* window regardless of the settings in the *Server Preferences* window.
   You can choose between TCT type *Raw*, *International,* and *Northern*. See the *TankMaster WinOpi Reference Manual (Document no. 303028EN)* for further information.
5. Specify the maximum number of Digital Alarms that will be used.
6. Specify the Reference Temperature to be used for inventory calculations. Normally, the standard value 15 °C is used.
7. Click the **OK** button to save the current settings and close the window.

5.3.5 Setting the Name Tag Prefixes

TankMaster WinSetup allows you to specify default name tag prefixes that will appear automatically when installing new tanks and devices. These prefixes can be ignored if you want to use other prefixes instead.

To specify name tag prefixes do the following:

1. From the **Service** menu choose **Preferences**.



2. In the *Preferences* window select the *Tag Prefixes* tab.
3. Type the prefixes to be used for tank names and device names and click the **OK** button.

   You can change the prefixes later at any time. Note that this will not affect names of existing tanks and devices.

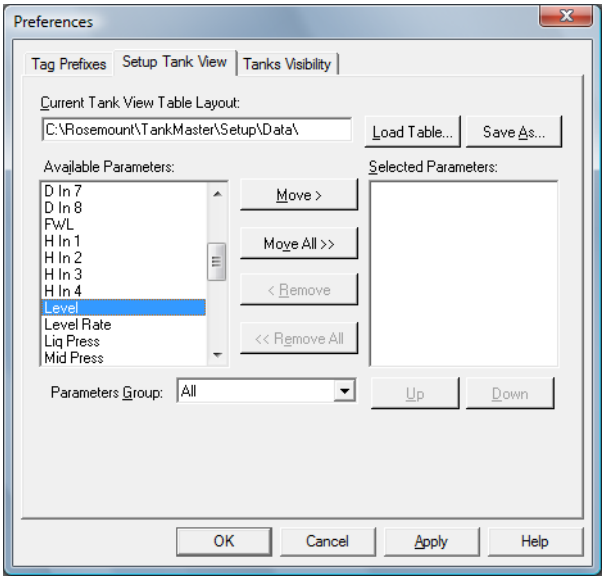
5.3.6 Tank View Layout

The *Setup Tank View* tab is used to specify variables to be presented in the *Tank View* window, see *Section 7: Viewing Tank Data*.

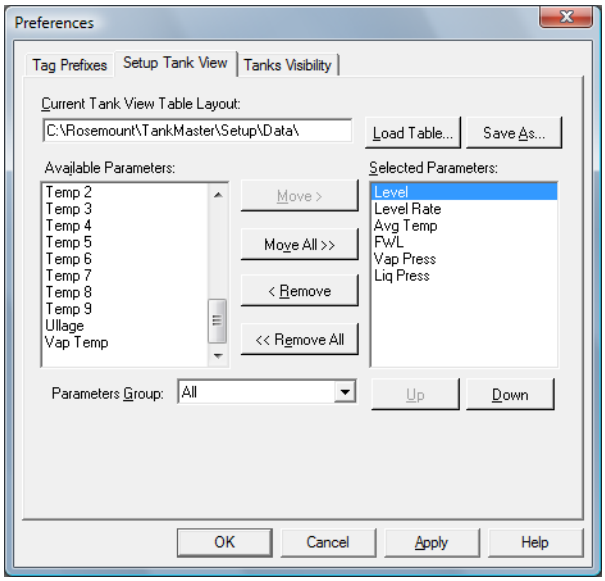
TankMaster WinSetup allows you to create a new tank view layout and store it on disk, or load an existing table layout from disk.

To specify a layout do the following:

1. From the **Service** menu choose **Preferences.**
2. In the *Preferences* window select the *Setup Tank View* tab.



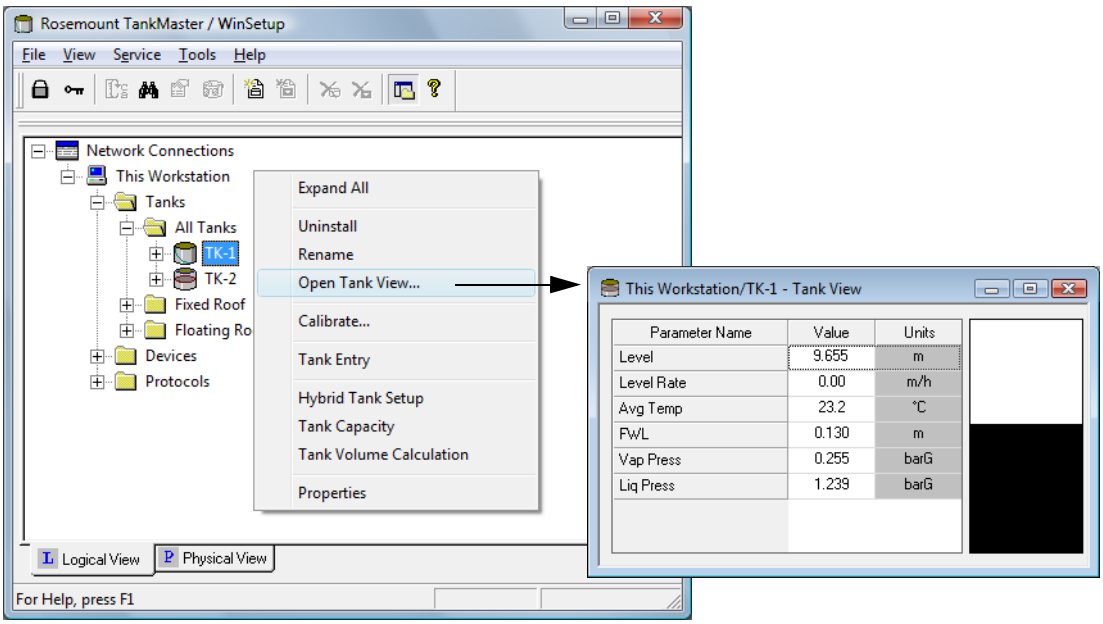
3. Click the **Load Table** button if you wish to edit an existing Table Layout.
4. In the *Available Parameters* pane on the left-hand side of the *Preferences/Setup Tank View* window, select the parameter to be presented in the *Tank View* window (see *Section 7: Viewing Tank Data*).
5. Click the **Move** button to move it to the *Selected Parameters* pane on the right-hand side of the *Preferences/Setup Tank View* window.
6. Repeat steps 4 to 5 for each parameter you wish to include.
   The **Move All** button allows you to move all variables at once to the *Selected Parameters* list box.
7. Ensure that all parameters to appear in the *Tank View* window are included in the *Selected Parameters* list box as illustrated below:



8. Click the **Save As** button if you wish to store the current tank view table for future use.
9. Click the **OK** button to save the current Tank View settings and close the window.

NOTE!
When clicking the **Apply** or the **OK** button, the parameter setup is stored in the table layout that is currently used by the *Tank View* window.

To view the specified tank parameters click the right mouse button and choose the **Open Tank View** option:

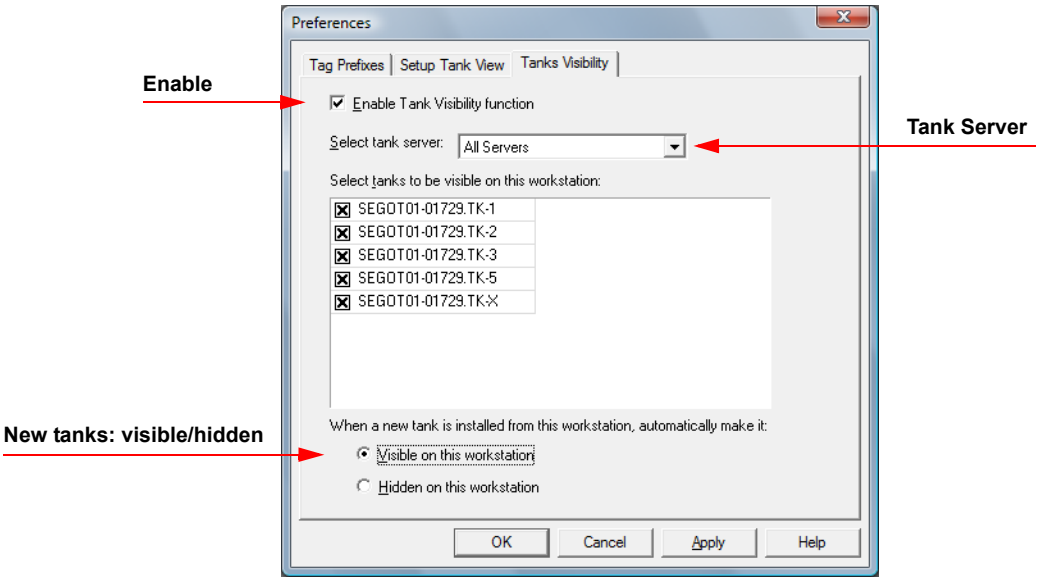


5.3.7 Tank Visibility

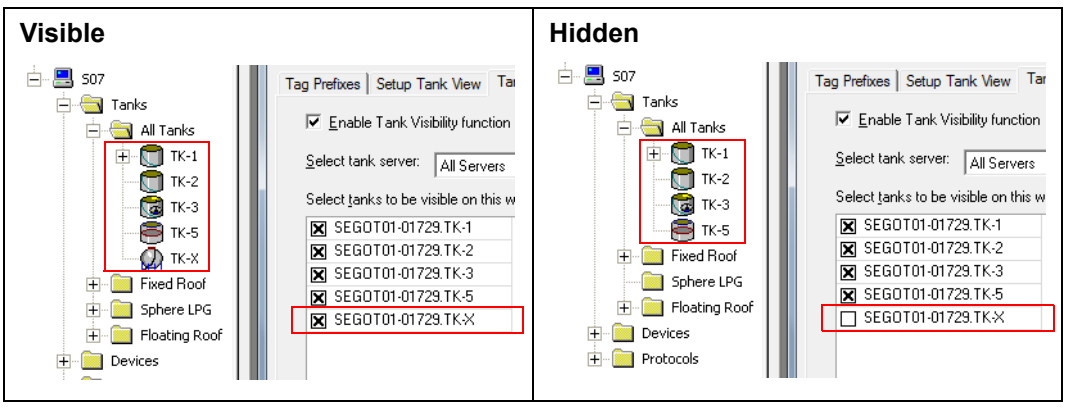
The *Tanks Visibility* tab lets you configure tanks on a remote tank server to make them visible on the current WinOpi client.

To specify tanks to be visible on the current WinOpi client:

1. From the **Service** menu choose **Preferences** and select the *Tanks Visibility* tab:



2. Select the *Enable Tank Visibility function* check box.
3. From the **Select tank server** drop-down list select the remote tank server on which the tanks are installed.
4. In the **Select tanks to be visible on this workstation** pane, check the tanks you wish to make visible on the current workstation.
5. Choose the **Visible on this workstation** option to make the selected tanks visible on the current workstation.
6. Click the **OK** button to store the current configuration and close the *Preferences* window.



5.4 FIELD DEVICE INSTALLATION - OVERVIEW

The *Rosemount TankMaster* configuration software supports configuration of all devices supported by the Raptor system:

- Rosemount 5900S Radar Level Gauge
- Rosemount 5400 Radar Level Transmitter
- Rosemount 5300 Guided Wave Radar
- Rosemount 2160 Field Communication Unit
- Rosemount 2165/75 Field Communication Unit
- Rosemount 2230 Graphical Field Display
- Rosemount 2240S Multi-input Temperature Transmitter
- Rosemount 2410 Tank Hub
- Rosemount 3051/3051S Pressure Transmitter
- Rosemount 644 Temperature Transmitter

Configuration

A *TankMaster* installation includes configuration of the Raptor system for communication with the *TankMaster* work station, and configuration of device specific parameters.

Configuration of a radar level gauge includes:

- mapping to a specific tank in the tank database of the 2410 Tank Hub
- setting up the communication parameters
- selecting the antenna type
- setting up the tank geometry
- configuration of tank environment parameters

Configuration of a Auxiliary Tank Devices (ATDs) includes:

- specifying communication address
- mapping of measurement variables to source device
- configuration of the 2240S Multi-input Temperature Transmitter
- configuration of temperature elements
- configuration of water level sensor
- configuration of the 2230 Graphical Field Display

5.5 INSTALLING A ROSEMOUNT 2160 FCU

5.5.1 Introduction

Installing a Rosemount 2160 Field Communication Unit (FCU) in a Rosemount Raptor system includes the following basic steps:

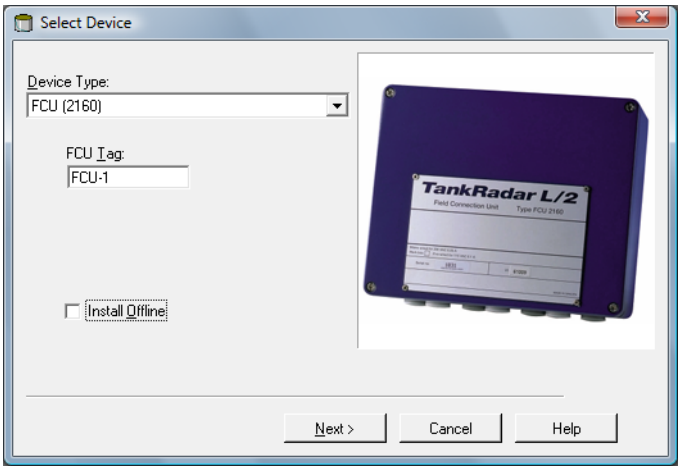
1. Specify device type and name tag.
2. Enable communication with the TankMaster PC.
3. Configure the Group bus and Field bus ports for communication with Rosemount 2410 Tank Hubs and TankMaster work stations.
4. Configure the Slave Database.

Configuration examples that illustrate how the 2160 Slave Database is related to the Tank Database of a 2410 Tank Hub is shown in “Examples of 2160 FCU Slave Database Configuration” on page 5-32.

5.5.2 Installation Procedure

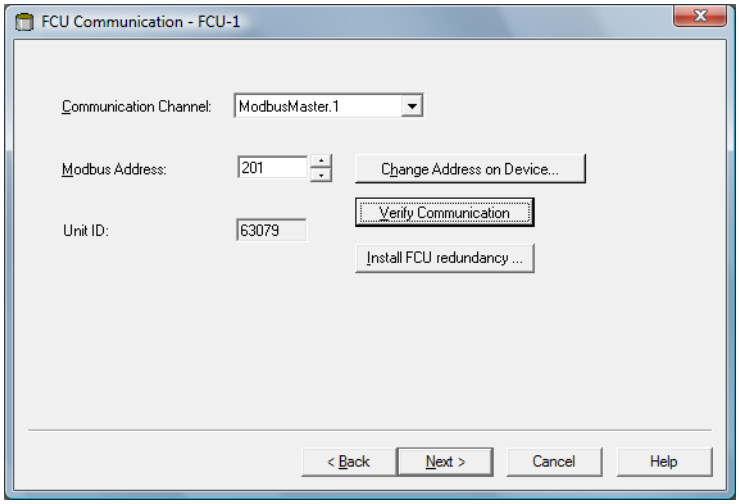
To install and configure a 2160 FCU do the following:

1. Start the device installation wizard. See *“Using the Device Installation Wizard” on page 5-5* for more information.



2. Select device type:
   a. Choose device type **FCU 2160**.
   b. Specify a name of the Field Communication Unit in the **FCU Tag** input field. This tag will be used as an identifier when the Rosemount 2160 is shown in various windows and dialogs. The TankMaster program automatically suggests the first part of the name as specified in the *Tag Prefixes* window, see *“Setting the Name Tag Prefixes” on page 5-20*.
   c. Click the **Next** button to continue the installation procedure.

3. FCU 2160 communication setup.



Choose the communication protocol channel which is associated with the TankMaster workstation communication port that is connected to the 2160 FCU.

To check which channels are enabled:

a. in the WinSetup workspace open the **Protocols** folder
b. click the right mouse button on the **ModbusMaster** protocol icon
c. choose the **Properties** option

To check which communication port that is associated with a certain channel:

a. right-click the protocol channel icon
b. open the *Communication* tab and check which communication port that is selected

See chapter *“Master Protocol Channel Configuration” on page 5-7* for more information on how to configure communication protocols.

The 2160 FCU can be connected to a TankMaster PC via a Rosemount 2180 Field Bus Modem, or directly using the RS232 interface, see “Communication Protocol Setup” on page 5-6.

4. To verify communication with the 2160 FCU, enter the Field Communication Unit’s **Modbus Address** and click the **Verify Communication** button. The Unit Id will appear if the correct Modbus Address was entered (the 2160 is shipped with the default Modbus address=245).

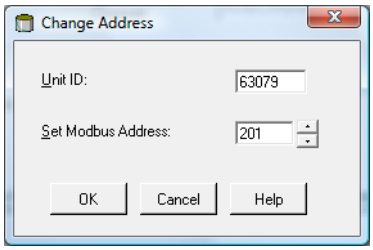
In case you would like to change the current Modbus address, or the address is unknown, click the **Change Address on Device** button.

NOTE!
In case several FCUs are connected using the same default address (245), you will have to change the addresses of the FCUs before the Verify command can be used. See ”How to change the Modbus address of the FCU 2160” for more information.

NOTE!
For information on Field Communication Unit redundancy, see the *Rosemount TankMaster Redundancy System - User´s Guide* (Document No. 303032EN).

How to change the Modbus address of the FCU 2160

a. In the *FCU Communication* window click the **Change Address on Device...** button to open the *Change Address* window:



b. Enter the **Unit ID** and the new **Modbus address**.

When changing the device address, the Unit Id is used as a unique identifier of the device. The Unit Id can be found on a label mounted on the device.

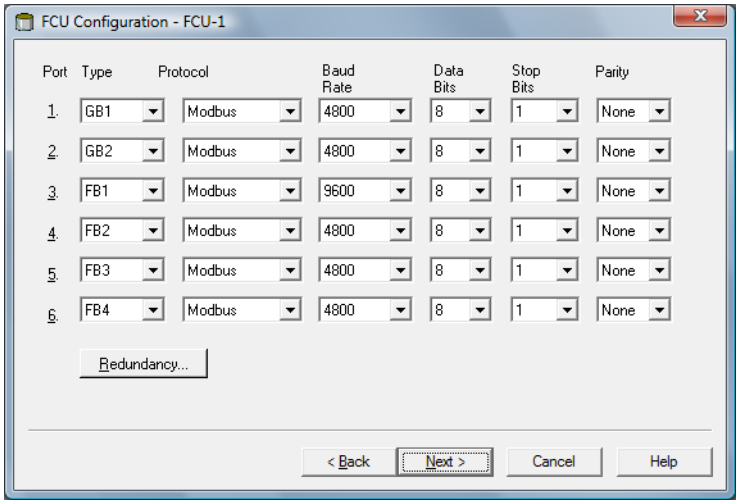
(If there is no other device connected that uses the same address as the current device, you can find the Unit Id by typing the current address into the Address field in the *FCU Communication* window and clicking the **Verify Communication** button).

c. Click the **OK** button to confirm the settings and to close the *Change Address* window.

d. In the *FCU Communication* window click the **Verify Communication** button to check if communication is established between the TankMaster work station and the 2160 FCU. The **Unit ID** will appear when TankMaster finds the 2160.

5. In the *FCU Communication* window click the **Next** button to continue the installation procedure of the 2160 FCU.

6. Configure the Group Bus (GB) and Field Bus (FB) ports on the FCU.



   a. Check that the correct port type is selected(1). The Rosemount 2160 has six communication ports. They are normally configured as two Group Bus ports and four Field Bus ports.
   Group Bus ports can be connected to TankMaster work stations as well as to other hosts.
   The **Field Bus** ports are connected to Rosemount 2410 Tank Hubs and level gauging devices.
   b. Ensure that the Modbus protocol is selected.
   c. Ensure that the following Modbus protocol communication parameters are used for the fieldbus that the Rosemount 2410 Tank Hub is connected to:

Table 5-1. Modbus communication parameters for fieldbus communication with a Rosemount 2410 Tank Hub

Parameter	RS485 bus	TRL2 bus
Baud rate	9600	4800
Databits per character	8	8
Stop bits	1	1
Parity	No	No

See “Communication Protocol Setup” on page 5-6 for more information.

   d. The **Redundancy** button is not used for stand-alone FCU installations.
   e. Click the **Next** button to open the *FCU Properties/Slave Database* window.

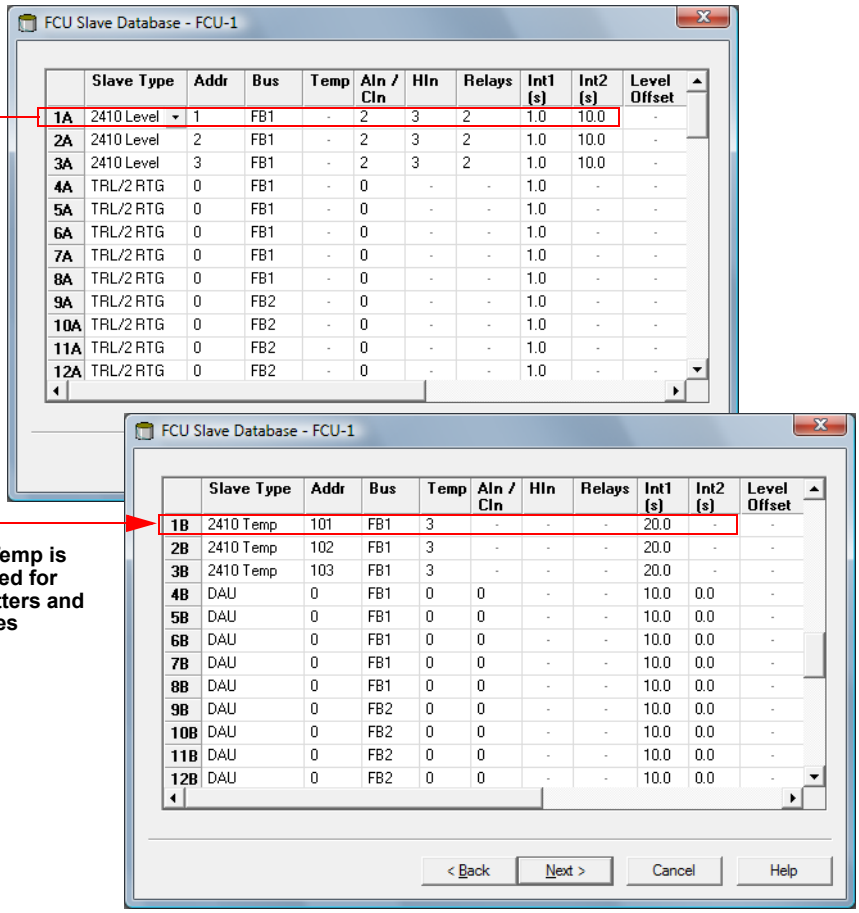
(1) As standard the 2160 FCU is equipped with FCM communication boards for the TRL2 bus. RS-485 communication requires a FCI board.

7. Configure the Slave Database.

   The *FCU Slave Database* ensures that the 2160 FCU requests information from all the connected field devices. The 2160 FCU is compatible with the *TRL2* and *Rex* systems. Therefore, two Modbus addresses are used for each tank. Each position in the FCU Slave Database represents one tank. Positions 1A to 32A are used for level gauges such as the Rosemount 5900S and other supported level gauges. Positions 1B to 32B are used for Rosemount 2410 Tank Hubs and Auxiliary Tank Devices (ATDs) such as the Rosemount 2240S Multi-input Temperature Transmitter.

1. Select Slave Type=2410 Level for level gauges connected to the 2410

2. Slave Type=2410 Temp is automatically assigned for temperature transmitters and other auxiliary devices



It is very important that the 2160 FCU Slave Database is properly configured to allow communication between the Rosemount 2160 Field Communication Unit, the Rosemount 2410 Tank Hub, and the field devices such as level gauges and other devices.

NOTE!
Once all devices and tanks are installed and configured, the position of a device in the Slave Database may not be changed, since this will result in corrupt mapping of tank to Slave Database position.

To configure the FCU Slave Database:

a. Select a free database position (1A, 2A ...) for the level gauge device to be configured.
b. Choose Slave type=**2410 Level**.
The corresponding Slave Database position (1B, 2B ...) for temperature transmitters and other auxiliary tank devices is automatically assigned to Slave Type=**2410 Temp**.
c. Enter **Modbus addresses** for level gauges and auxiliary tank devices (ATD). Ensure that the same database positions, .i.e. **1**A/**1**B, **2**A/**2**B and so on, are used for level gauges and ATDs on the same tank.
d. Select the communication fieldbus (FB1, FB2, FB3, FB4) that the Rosemount 2410 is connected to. Normally there are four fieldbus ports available on the 2160 Field Communication Unit. The RS485 bus is the standard fieldbus interface for a Rosemount 2410 Tank Hub connected to a Rosemount 2160 FCU.
e. If temperature elements are installed in the tank, type the number of elements in the **Temp** column.

The 2160 Slave Database and the 2410 Tank Database

In a typical Raptor system a Rosemount 2160 FCU collects measurement data from a number of tanks via one or more Rosemount 2410 Tank Hubs. The Modbus addresses of the field devices on the tank need to be stored in the *2160 FCU* slave database as well as in the *Rosemount 2410* tank database for proper communication with the control room PC.

Level Gauge Modbus Address - 2410 Level

The *2410 Level* address field in the 2160 FCU slave database is used for level gauges such as the Rosemont 5900S. This address also needs to be stored in the 2410 tank database as the *Level Modbus* address. This is normally done as part of the installation procedure of the Rosemount 2410 as described in chapter *“Installing a Rosemount 2410 Tank Hub” on page 5-38.*

ATD Device Modbus Address - 2410 Temp

The *2410 Temp* Modbus address in the 2160 FCU slave database is used for all devices on a tank except level gauges. This address also needs to be stored in the *ATD Modbus* address field of the 2410 tank database. This is normally done as part of the installation procedure of the Rosemount 2410 as described in chapter *“Installing a Rosemount 2410 Tank Hub” on page 5-38.*

The first tank in the 2410 tank database uses the Modbus address of the 2410 Tank Hub itself as the *ATD Modbus* address. Tank number two, three etc. use separate *ATD Modbus* addresses. The 2410 Modbus address is automatically set as the ATD Modbus address for tank position 1 in the 2410 Tank Database as illustrated in *Figure 5-5 on page 5-34*.

It is recommended that address range 1 to 99 is used for level gauges and 101 to 199 for ATD devices.

See **“Examples of 2160 FCU Slave Database Configuration” on page 5-32** for further information on how to configure the **Slave Database** of the *2160 Field Communication Unit (FCU)* and the **Tank Database** of the *Rosemount 2410 Tank Hub*.

Summary of FCU Slave Database entry fields

Slave type	2410 Level, (pos 1A-32A) or 2410 Temp, (pos 1B-32B)
Address	The Modbus address used for the connected devices. For level gauges it is recommended that address 1 to 99 is used. For ATD devices address 101 to 199 are recommended.
FCU field bus	The field bus that the selected device is connected to. In the standard configuration there are four field buses available.
Temps	The number of temperature elements connected to the temperature transmitter (for example a Rosemount 2240S).
Ain/Cin	Automatically configured
Hin	Automatically configured
Relays	Automatically configured
Interval 1	Automatically configured
Interval 2	Automatically configured
Level Offset	Not used

5.5.3 Examples of 2160 FCU Slave Database Configuration

The following examples illustrate how to configure Modbus addresses for level gauges such as the Rosemount 5900S, and ATD devices such as the Rosemount 2240S Multi-input Temperature Transmitter and the Rosemount 2230 Graphical Field Display.

In case a Rosemount 2160 Field Communication Unit (FCU) is included, the Modbus addresses must be stored in the *2160 FCU Slave Database* as well as in the *Rosemount 2410 Tank Database*.

See *"Installing a Rosemount 2410 Tank Hub" on page 5-38* for information on how to install and configure a Rosemount 2410 Tank Hub.

Example 1: single tank connected to one 2410 Tank Hub

This example includes two single tanks, each of which has one 2410 Tank Hub connected to a 5900S Radar Level Gauge, a 2240S Multi-input Temperature Transmitter, and a 2230 Graphical Field Display. Both 2410 Tank Hubs are connected to a TankMaster PC via a 2160 Field Communication Unit.

For each tank the Modbus addresses of the 5900S and other devices have to be entered in the **2160 FCU Slave Database** as well as the **2410 Tank Database**.

The 2230 and 2240S (and other non-level devices) are grouped as a single ATD device. Note that in this example each 2410 Tank Hub serves a single tank.

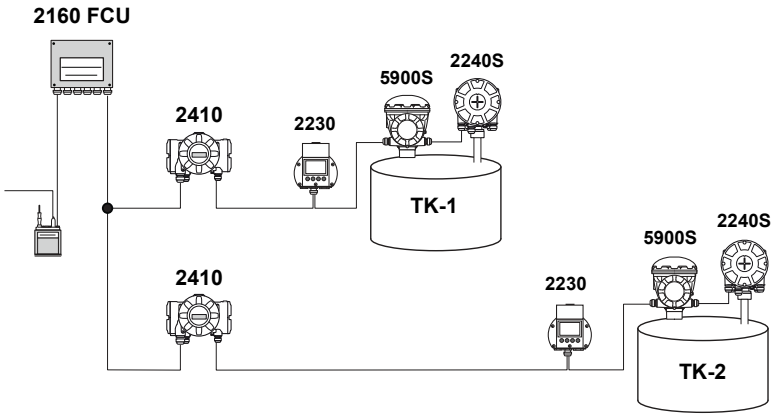
For tank position 1 in the 2410 Tank Database the ATD Modbus address is automatically assigned to the Modbus address of the 2410 Tank Hub itself. See also "Tank Database Setup" on page 5-42 for further information.

The Modbus address configuration is summarized in Table 5-2:

Table 5-2. Configuration of the 2160 FCU Slave Database and the 2410 Tank Database for two tanks and two 2410 Tank Hubs

	Modbus Address		
Tank	**5900S Level Gauge**	**ATD (2230, 2240S)**	**2410 Tank Hub**
TK-1	1	101	101
TK-2	2	102	102

Figure 5-3. Configuration example with one 2410 Tank Hub for each tank



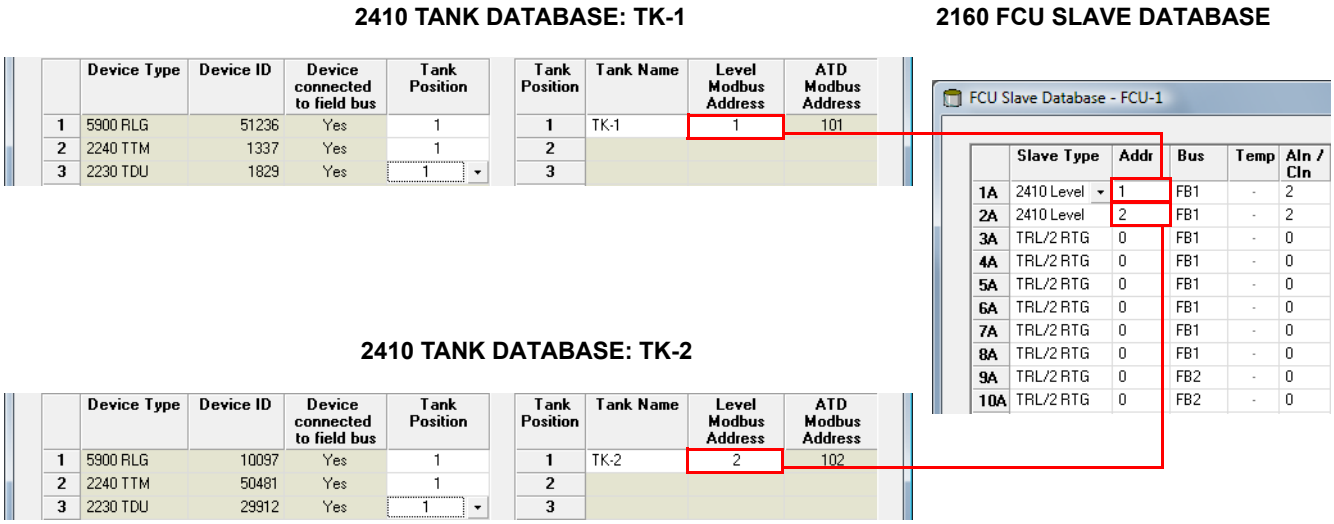
For each level gauge the **2410 Level** address in the 2160 FCU Slave Database must be equal to the **Level Modbus** address in the 2410 Tank Database.

In this example the Level Modbus address for tank **TK-1** is entered in position **1A** in the 2160 FCU Slave Database **and** in tank position **1** in the 2410 Tank Database.

The Level Modbus address for tank **TK-2** is entered in position **2A** in the 2160 FCU Slave Database **and** in tank position **1** in the 2410 Tank Database.

Figure 5-4 illustrates how to configure the 2160 FCU and the two 2410 Tank Hubs for the two level gauges on tanks TK-1 and TK-2:

Figure 5-4. The same **Level** device address must be configured in the 2160 Slave Database and the 2410 Tank Database



	Device Type	Device ID	Device connected to field bus	Tank Position
1	5900 RLG	51236	Yes	1
2	2240 TTM	1337	Yes	1
3	2230 TDU	1829	Yes	1

Tank Position	Tank Name	Level Modbus Address	ATD Modbus Address
1	TK-1	1	101
2			
3			

	Device Type	Device ID	Device connected to field bus	Tank Position
1	5900 RLG	10097	Yes	1
2	2240 TTM	50481	Yes	1
3	2230 TDU	29912	Yes	1

Tank Position	Tank Name	Level Modbus Address	ATD Modbus Address
1	TK-2	2	102
2			
3			

	Slave Type	Addr	Bus	Temp	AIn / CIn
1A	2410 Level	1	FB1	-	2
2A	2410 Level	2	FB1	-	2
3A	TRL/2 RTG	0	FB1	-	0
4A	TRL/2 RTG	0	FB1	-	0
5A	TRL/2 RTG	0	FB1	-	0
6A	TRL/2 RTG	0	FB1	-	0
7A	TRL/2 RTG	0	FB1	-	0
8A	TRL/2 RTG	0	FB1	-	0
9A	TRL/2 RTG	0	FB2	-	0
10A	TRL/2 RTG	0	FB2	-	0

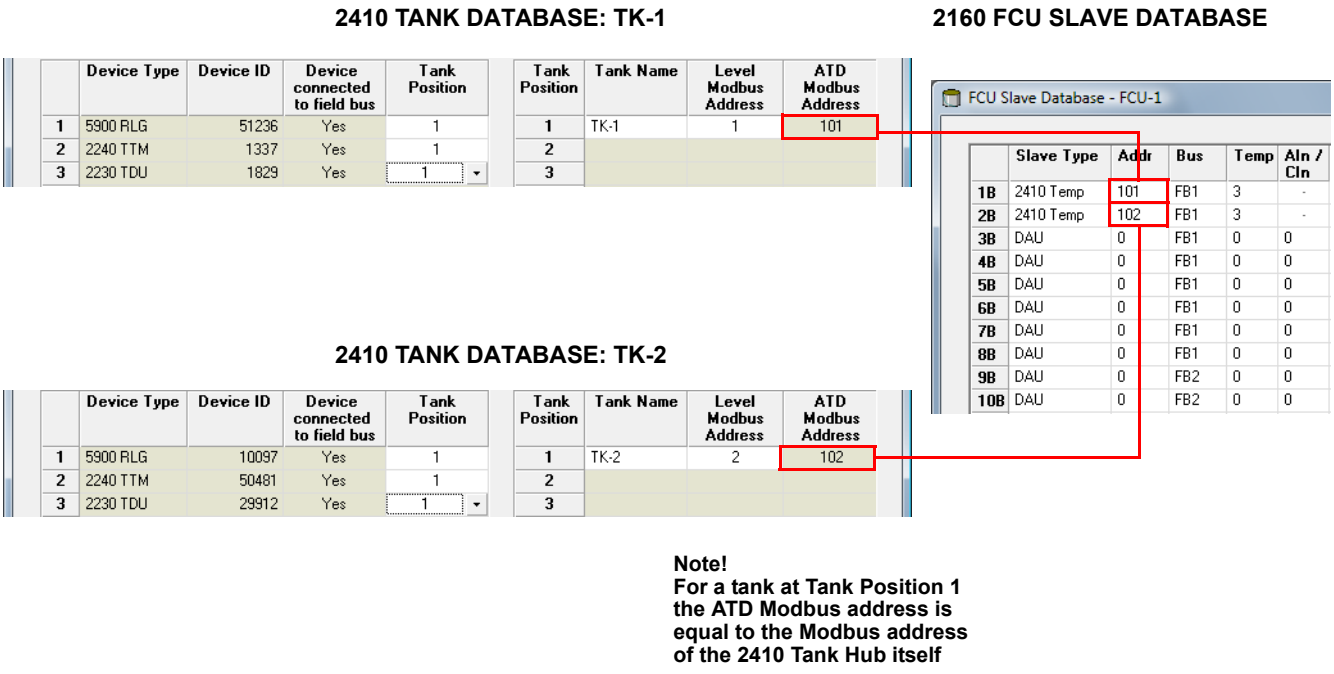
The **2410 Temp** address in the 2160 FCU Slave Database must be equal to the **ATD Modbus** address in the 2410 Tank Database.

For tank **TK-1** the ATD Modbus address is entered in position **1B** in the 2160 FCU Slave Database and is automatically assigned to tank position **1** in the 2410 Tank Database.

The ATD Modbus address for tank **TK-2** is entered in position **2B** in the 2160 FCU Slave Database and is automatically assigned to tank position **1** in the Tank Database of the second 2410 Tank Hub.

Figure 5-5 illustrates how to configure the 2160 FCU and the two 2410 Tank Hubs for the ATD devices on tanks TK-1 and TK-2:

Figure 5-5. The same Modbus address must be configured for the **ATD** devices in the 2410 Tank Database and the **2410 Temp** devices in the 2160 Slave Database



	Device Type	Device ID	Device connected to field bus	Tank Position
1	5900 RLG	51236	Yes	1
2	2240 TTM	1337	Yes	1
3	2230 TDU	1829	Yes	1

Tank Position	Tank Name	Level Modbus Address	ATD Modbus Address
1	TK-1	1	101
2			
3			

	Slave Type	Addr	Bus	Temp	AIn / CIn
1B	2410 Temp	101	FB1	3	-
2B	2410 Temp	102	FB1	3	-
3B	DAU	0	FB1	0	0
4B	DAU	0	FB1	0	0
5B	DAU	0	FB1	0	0
6B	DAU	0	FB1	0	0
7B	DAU	0	FB1	0	0
8B	DAU	0	FB1	0	0
9B	DAU	0	FB2	0	0
10B	DAU	0	FB2	0	0

	Device Type	Device ID	Device connected to field bus	Tank Position
1	5900 RLG	10097	Yes	1
2	2240 TTM	50481	Yes	1
3	2230 TDU	29912	Yes	1

Tank Position	Tank Name	Level Modbus Address	ATD Modbus Address
1	TK-2	2	102
2			
3			

Note!
For a tank at Tank Position 1 the ATD Modbus address is equal to the Modbus address of the 2410 Tank Hub itself

Example 2: several Tanks connected to one 2410 Tank Hub

This example includes three tanks, each of which has one Rosemount 5400 Radar Level Transmitter and one Rosemount 2240S Multi-input Temperature Transmitter. All tanks are connected via the Tankbus to the same Rosemount 2410 Tank Hub. The 2410 Tank Hub is connected to a TankMaster PC via a 2160 Field Communication Unit.

For each tank the Modbus addresses of the 5400 and other devices have to be entered in both the **2160 FCU Slave Database** and the **2410 Tank Database**.

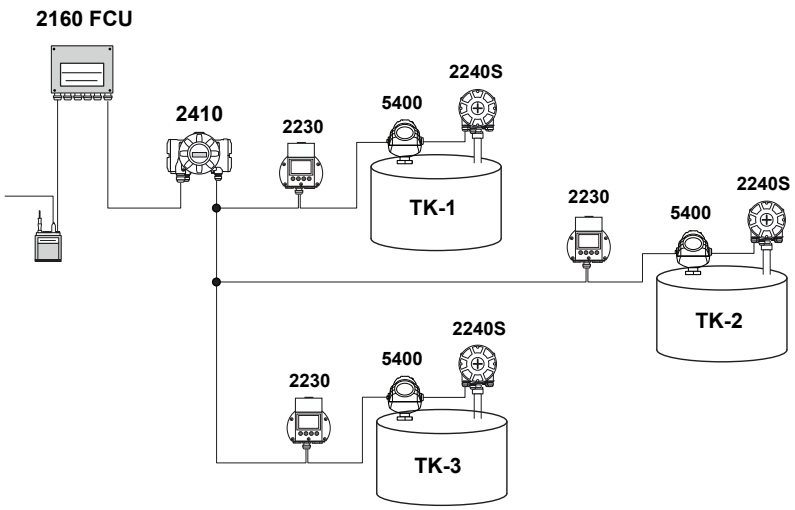
The 2240S and other non-level devices are handled as a single ATD device. In this example the 2410 Tank Hub serves three tanks. For Tank Position 1 in the 2410 Tank Database the ATD Modbus address is automatically set equal to the Modbus address of the 2410 Tank Hub itself. See “Tank Database Setup” on page 5-42 for further information.

The Modbus address configuration is summarized in Table 5-3 below:

Table 5-3. Configuration of the 2160 FCU Slave Database and the 2410 Tank Database for three tanks and one 2410 Tank Hub

	Modbus Address		
Tank	**5400 Level Transmitter**	**ATD (2230, 2240S)**	**2410 Tank Hub**
TK-1	1	101	101
TK-2	2	102	- " -
TK-3	3	103	- " -

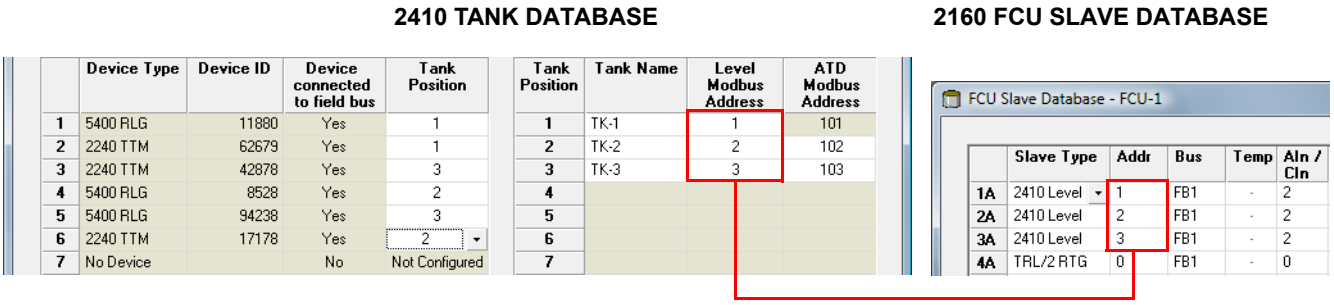
Figure 5-6. Configuration example with one 2410 Tank Hub and many tanks



The **2410 Level** addresses in the 2160 FCU Slave Database must be equal to the **Level Modbus** addresses in the 2410 Tank Database.

In this example the Level Modbus addresses of the three tanks are entered in positions 1A, 2A, and 3A in the 2160 FCU Slave Database and in tank positions 1, 2, and 3 in the 2410 Tank Database as illustrated in Figure 5-7:

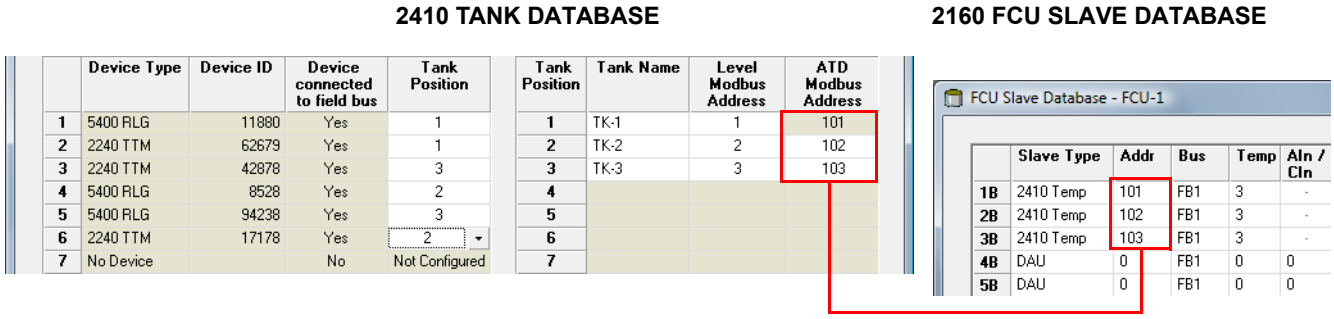
Figure 5-7. The same **Level** addresses must be configured in the Slave Database and the Tank Database



The **2410 Temp** Modbus addresses in the 2160 FCU Slave Database must be equal to the **ATD Modbus** addresses in the 2410 Tank Database.

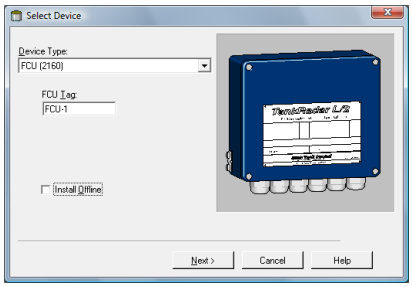
In this example the 2410 Temp Modbus Addresses for the three tanks are entered in positions 1B, 2B, and 3B in the 2160 FCU Slave Database and in tank positions 1, 2, and 3 in the 2410 Tank Database as illustrated in Figure 5-8:

Figure 5-8. The same Modbus addresses must be configured for the **ATD** devices in the 2410 Tank Database and the **2410 Temp** devices in the 2160 Slave Database

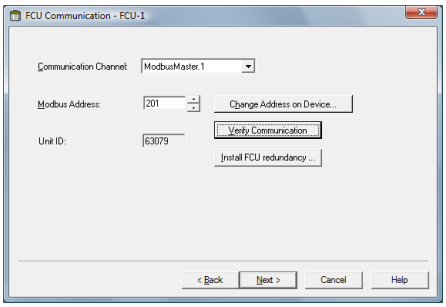


Note that in the 2410 Tank Database the Modbus address of the 2410 itself is automatically assigned to the ATD Modbus address for tank position 1.

5.5.4 Summary of 2160 Installation and Configuration

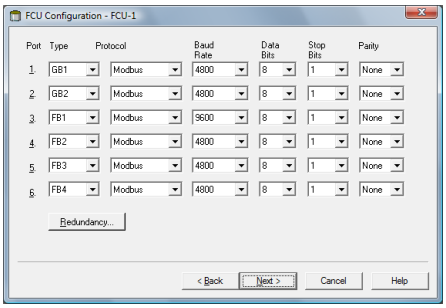


Select device type FCU 2160.



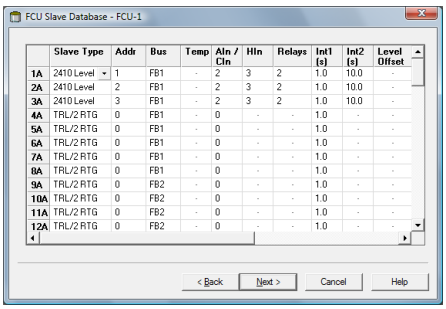
Communication setup.

Assign address and choose communication channel.



FCU Configuration.

Specify communication parameters for each port.



FCU Slave Database configuration.

Configure level gauges and temperature multiplexers.

5.6 INSTALLING A ROSEMOUNT 2410 TANK HUB

The installation wizard covers basic configuration of a Rosemount 2410 Tank Hub. If further configuration of Primary Bus, Secondary Bus, Relay Output, and Hybrid Density Calculation is required this must be done separately via the *2410 Tank Hub Properties* window, see the *Rosemount 2410 Reference Manual* (Document No. 300530EN).

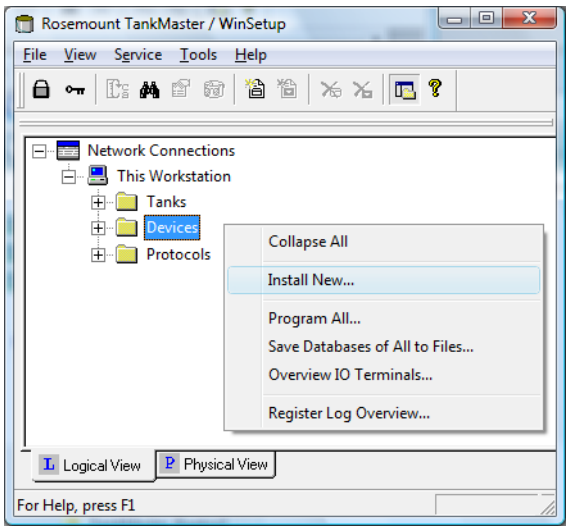
5.6.1 Installation Wizard

It is very important that the 2160 FCU Slave Database is properly configured prior to configuring the Rosemount 2410 Tank Hub. This ensures that the 2160 is able to collect data from the different field devices.

See “Installing a Rosemount 2160 FCU” on page 5-25 for more information on how to configure the 2160 FCU Slave Database.

Perform the following steps to start the installation wizard in TankMaster WinSetup:

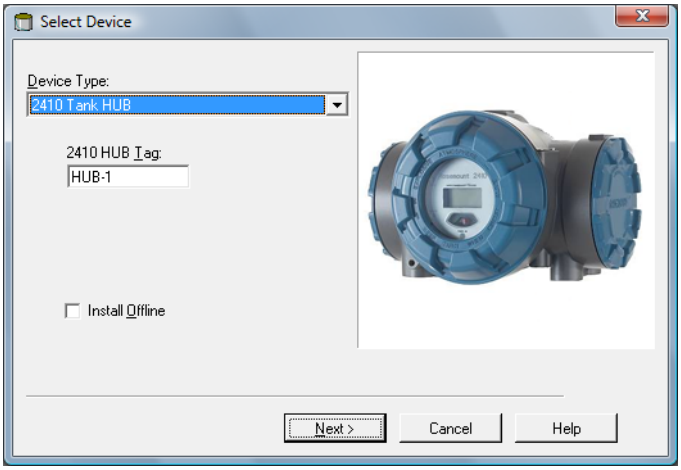
1. In the *Workspace* window select the Device folder.



2. Click the right mouse button and select **Install New**, or from the **Service** menu choose the **Devices/Install New** option.
   Now the *Select Device* window appears.

Device Type

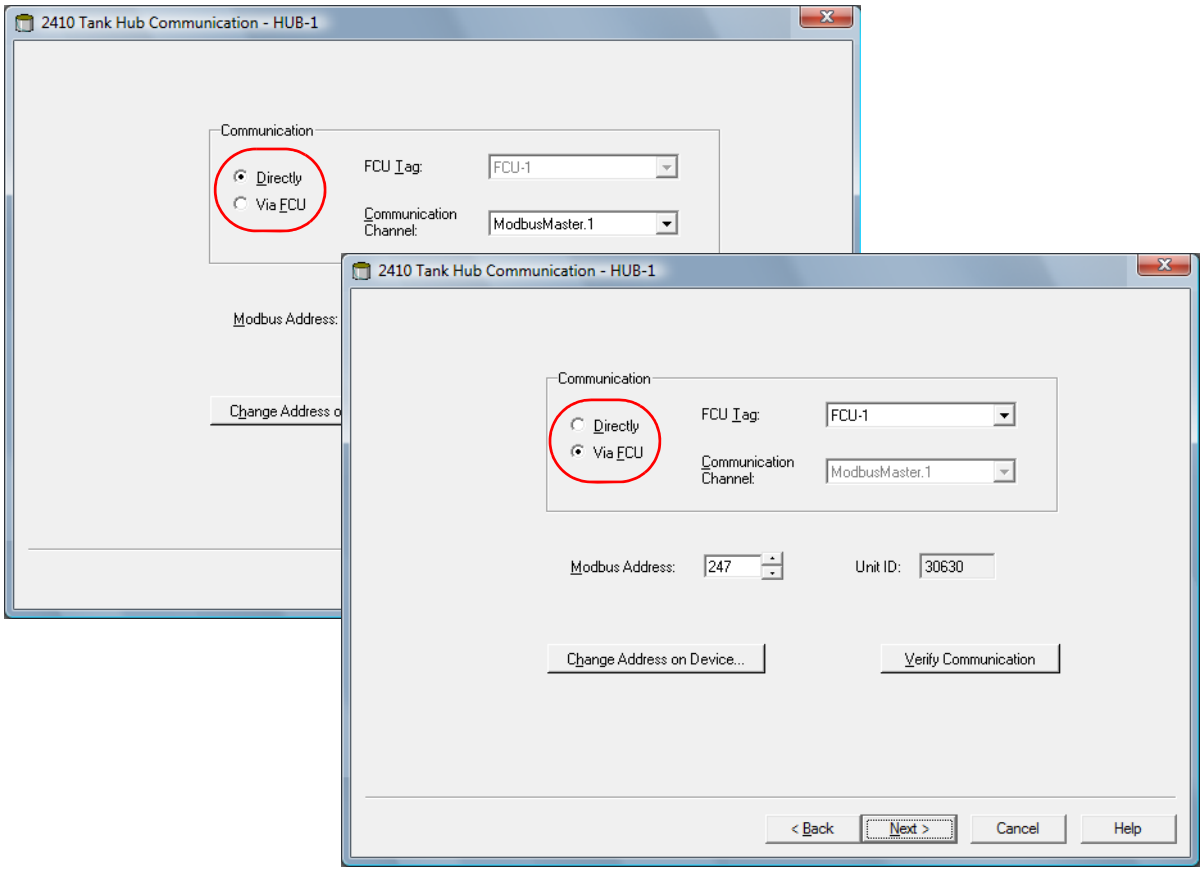
3. From the **Device Type** drop-down list, choose the 2410 Tank Hub option.



4. Type a name in the **2410 HUB Tag** input field.
   The 2410 HUB tag will be used as an identifier for the Rosemount 2410 Tank Hub in various windows and dialogs.
5. Click the **Next** button.

Communication Setup

6. Specify whether TankMaster communicates directly with the 2410 Tank Hub, or via a 2160 Field Communication Unit.



7. If the 2410 Tank Hub is connected to a 2160 FCU, select the appropriate 2160 from the **FCU Tag** drop-down list.
8. If the 2410 is connected directly to a TankMaster PC and not via a 2160 FCU, specify the communication protocol channel which is associated with the communication port on the TankMaster workstation. To check which channels are enabled:
   a. in the WinSetup workspace open the **Protocols** folder
   b. click the right mouse button on the **ModbusMaster** protocol icon
   c. choose the **Properties** option

   To check which communication port that is associated with a certain channel:
   a. right-click the protocol channel icon
   b. open the *Communication* tab and check which communication port that is selected.

   See chapter “Master Protocol Channel Configuration” on page 5-7 for more information on how to configure communication protocols.

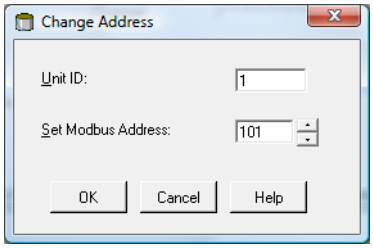
9. To verify communication with the 2410 Tank Hub, type the current Modbus address and click the **Verify Communication** button. The Unit Id will appear if the correct Modbus address was entered (the 2410 is shipped with the default Modbus address=247).

   In case you would like to change the current Modbus address, or the address is unknown, click the **Change Address on Device** button.

NOTE!
In case several 2410 Tank Hubs are connected using the same default address (247), you will have to change the addresses before the Verify command can be used. See ”How to change the Modbus address of the 2410” for more information.

How to change the Modbus address of the 2410

a. In the *2410 Tank Hub Communication* window click the **Change Address on Device...** button to open the *Change Address* window.



b. Enter the **Unit ID** and the new **Modbus Address**

   When changing the device address, the Unit Id is used as a unique identifier of the device. The Unit Id can be found on a label mounted on the device.

   Tip! If there is no other device connected that uses the same address as the current device, you can find the Unit Id by typing the current address into the Address field in the *2410 Tank Hub Communication* window and clicking the **Verify Communication** button.

c. Click the **OK** button to confirm the address settings and close the *Change Address* window.

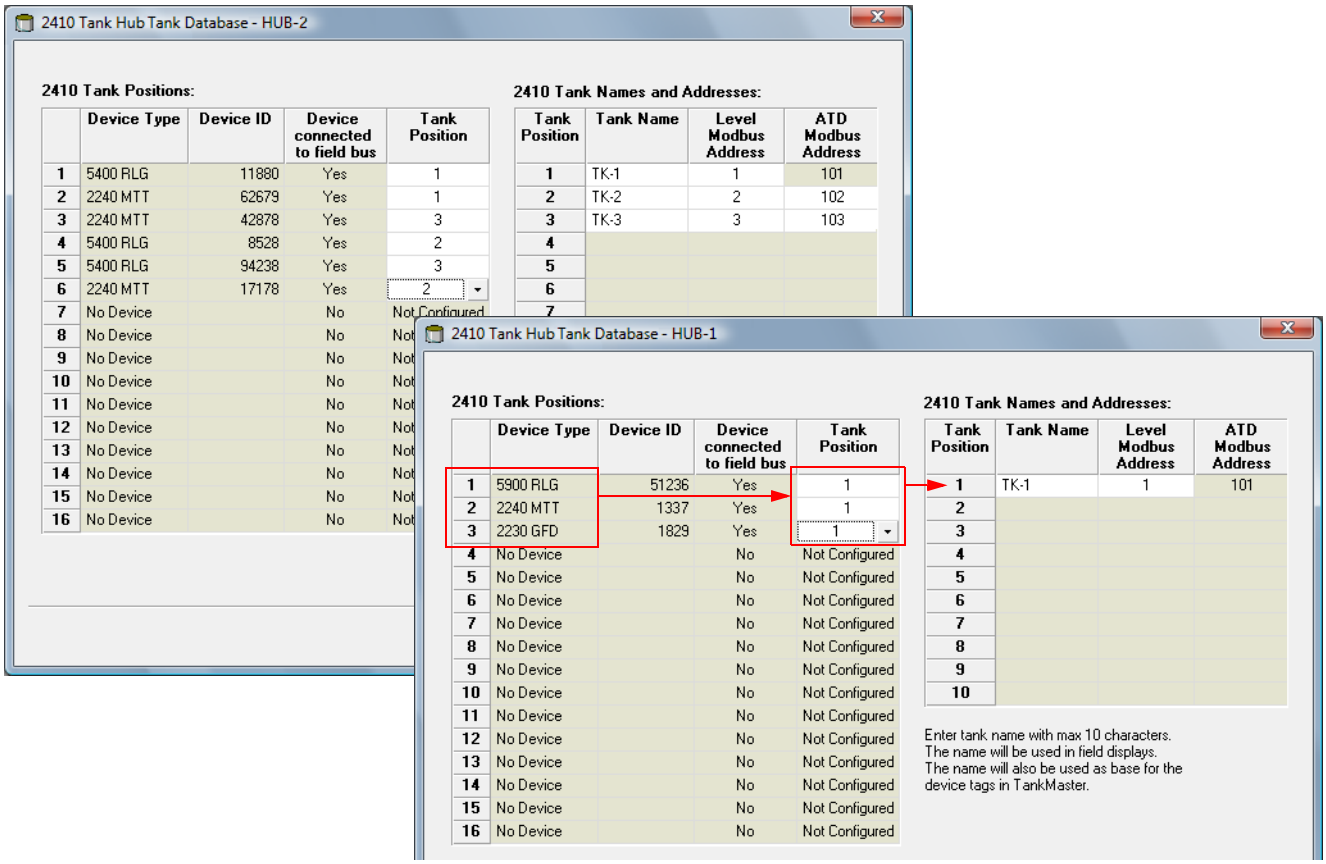
d. In the *2410 Tank Hub Communication* window click the **Verify Communication** button to check that communication is established between the TankMaster work station and the 2410 Tank Hub. The **Unit ID** will appear when TankMaster finds the 2410.

10. In the *2410 Tank Hub Communication* window click the **Next** button to continue the installation procedure of the 2410.

Tank Database Setup

Each tank is represented by a position in the Rosemount 2410 tank database. Each device connected to the 2410 is mapped to a tank position. For each tank position, a name is assigned as an identifier of the tank. The 2410 tank database maps field devices to the various tanks, and identifies the devices whenever there is a request for measurement data from the 2160 FCU.

11. The **Device Type** column lists all devices that communicate on the Tankbus. Ensure that all devices connected to the Tankbus appear in the **Device Type** list to verify proper communication.
12. In the **Tank Position** column, map each device to a tank by selecting the appropriate number from the drop-down list in the 2410 tank database as illustrated below. The example below illustrates two different cases; a single tank connected to a 2410 Tank Hub, and another case with three(1) tanks connected to a 2410. Note that tank positions which are mapped to devices are enabled for editing of tank name and Modbus address in the right-hand pane of the *Tank Hub Tank Database* window.



13. Type the desired names in the **Tank Name** field. These tank names should also be used at a later stage when installing the tanks associated with the current 2410 Tank Hub, see “Installing a Tank” on page 5-101.

(1) Mapping more than one tank requires the Multiple tank version of the Rosemount 2410 Tank Hub. See the Rosemount Raptor System Technical Description for more information.

14. For each tank, specify a Modbus address in the **Level Modbus Address** column to be associated with the level gauge. This must be the same Modbus address as configured in the 2160 FCU Slave Database. The Level Modbus address is used to identify level gauges when distributing requests for measurement data from the 2160 Field Communication Unit.
15. The various non-level devices on a tank are represented by a single ATD device in the Raptor system.

    In tank position 1, the Rosemount Raptor system uses the Modbus address of the 2410 Tank Hub itself as the ATD Modbus address. In the example above, the 2410 Tank Hub has Modbus address 101. This address is automatically used as the ATD Modbus address as well.

    For tank positions 2 to 10 you have to specify Modbus addresses in the **ATD Modbus Address** column to be associated with the different ATD devices. The ATD Modbus addresses must be the same as configured in the 2160 FCU Slave Database.

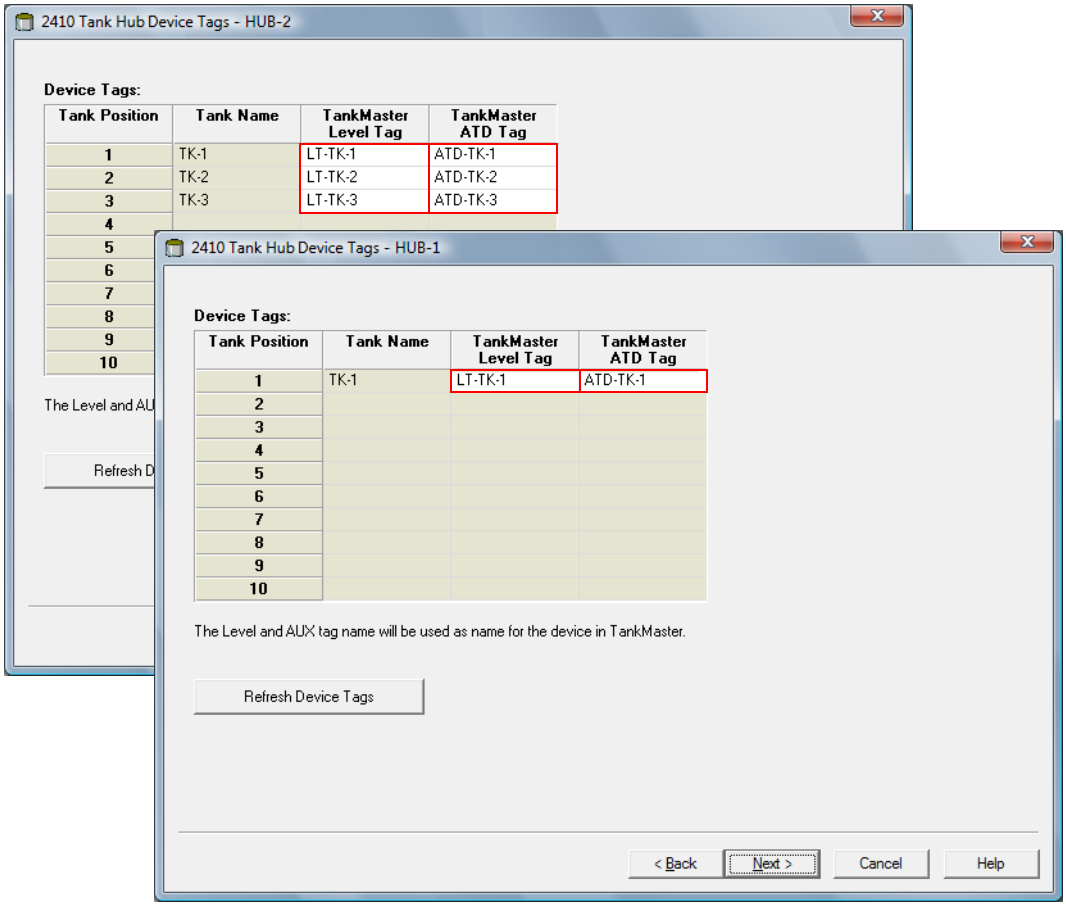
    An empty ATD Modbus address field indicates that no ATD device is mapped to that particular tank position.

    See *“Installing a Rosemount 2160 FCU” on page 5-25* and *“Examples of 2160 FCU Slave Database Configuration” on page 5-32* for further information on how the the 2160 slave database is related to the 2410 tank database.

16. Click the **Next** button to continue the installation procedure.

Device Tag Setup

Level Tags and **ATD Tags** are configured automatically based on the tank names in the *2410 Tank Hub Tank Database* window and the configuration of tag prefixes in the *Preferences/Tag Prefix* window, see “Setting the Name Tag Prefixes” on page 5-20. However, it is possible to edit the Level Tags and ATD Tags.

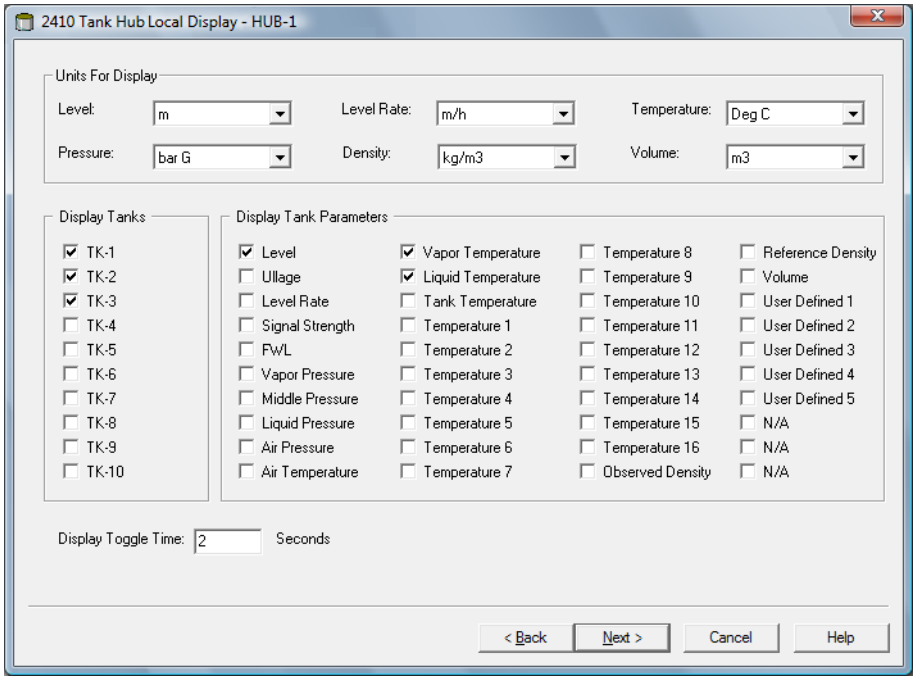


17. Verify that the **TankMaster Level Tag** is correct or type a new one.
18. Verify that the **TankMaster ATD Tag** is correct or type a new one. If the ATD tag field is empty and disabled then no ATD device is associated with that tank position.
19. Click the **Next** button to continue the installation procedure.

Local Display Setup

Choose the parameters to be displayed on the integral display panel on the Rosemount 2410 Tank Hub. The display will alternate between the selected items at a rate given by the Display Toggle Time.

20. In the *Units for Display* pane, choose the desired measurement units from the drop-down lists. These measurement units will be used by the 2410 local display when presenting the various tank variables.



21. In the *Display Tanks* pane, select check boxes for the tanks that you want to present in the 2410 integral display.
22. In the *Display Tank Parameters* pane, choose the tank parameters to be displayed by checking the appropriate boxes. See Table 5-4 below for more information on available parameters:

Table 5-4. Various Tank Parameters can be presented on the 2410 local display

Variable	Description
Level	The current product level in the displayed tank.
Distance	Distance (ullage) is measured from the Tank Reference point to the product surface.
Level rate	The speed at which the product surface moves when emptying or filling the tank.
Signal strength	The signal strength of the radar level gauge measurement signal.
Free water level	Water surface level at the bottom of the tank. Available when a water level sensor is installed in the tank.
Vapor pressure	Tank vapor pressure.
Liquid pressure	Product liquid pressure.
Air pressure	Ambient air pressure.
Air temperature	Ambient air temperature.
Vapor temperature	Tank vapor temperature.
Product temperature	Average temperature of the product.
Tank temperature	Average temperature of product and vapor in the tank.

Variable	Description
Temperature 1, 2 ...	Temperature value measured by element 1, 2, etc.
Observed density	The actual product density at the current product temperature.
Reference density	Density at reference temperature (used for inventory calculations).
Volume	Total observed volume.
User defined 1 to 5	Variables for advanced configuration.

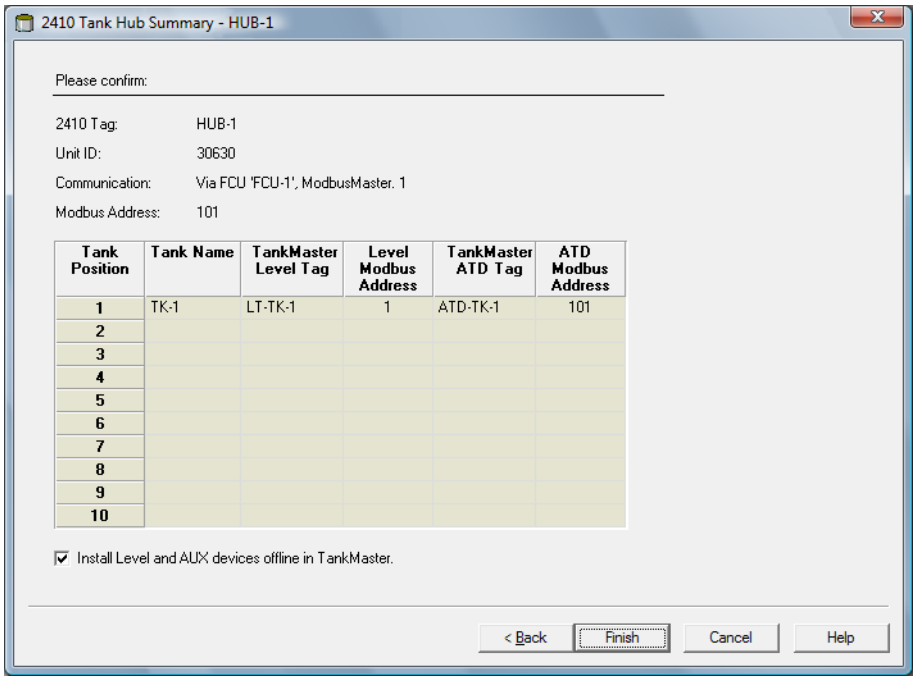
23. Enter the **Display Toggle Time**. Information on the local display alternates between the selected items at a rate given by the Display Toggle Time value.
24. Click the **Next** button to continue the installation procedure.

Configuration Summary

The *2410 Tank Hub Summary* window shows information about all devices included in the 2410 Tank Database for the current installation.

25. Verify that all Modbus addresses, level tags and ATD tags presented in the *2410 Tank Hub Summary* window are correct.

    In case you would like to make any changes, click the **Back** button until the appropriate window appears.



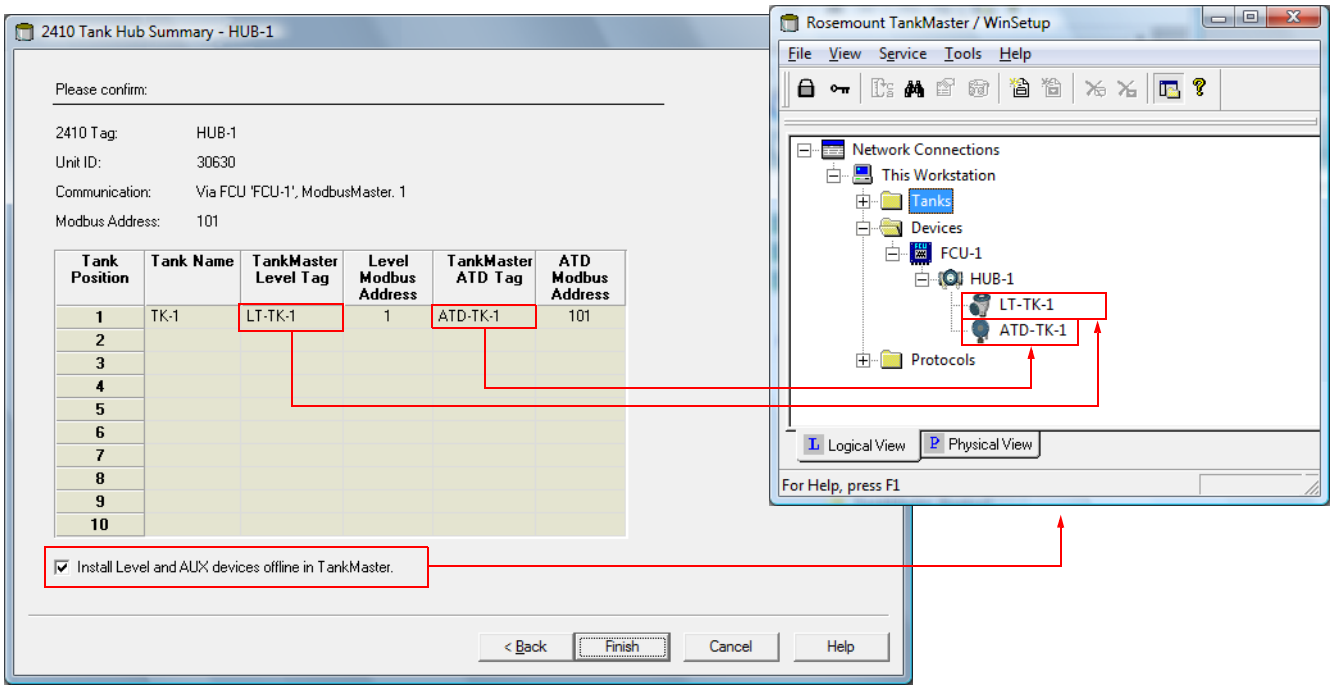
26. By selecting the **Install Level and AUX devices...** check box in the lower left-hand corner of the *2410 Tank Hub Summary* window, the field devices connected to the 2410 via the Tankbus will be installed automatically in the TankMaster workspace as illustrated in Figure 5-9 on page 5-48. The check box is selected by default. This is the recommended setting.

    After the devices are installed they must be configured via the *Properties* window, see for example “Installing a Rosemount 5900S Radar Level Gauge” on page 5-51 and “Installing Auxiliary Tank Devices” on page 5-65.

    The installation procedure will be facilitated by using the **Install Level and AUX devices...** check box. However, the field devices (level gauge and ATD) can be installed at a later stage by using the device installation wizard for the respective device, see “Using the Device Installation Wizard” on page 5-5.

27. Click the **Finish** button to confirm the installation. The installed devices will appear in the *Workspace* window as illustrated in Figure 5-9 on page 5-48.

Figure 5-9. The devices appear in the WinSetup workspace window



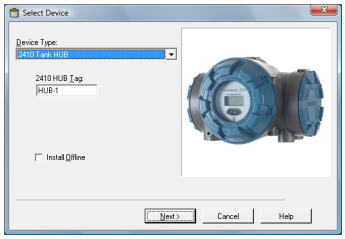
Advanced Configuration

The installation wizard does not include all configuration options available for the 2410 Tank Hub. Further configuration can be done via the *2410 Tank Hub Configuration* window:

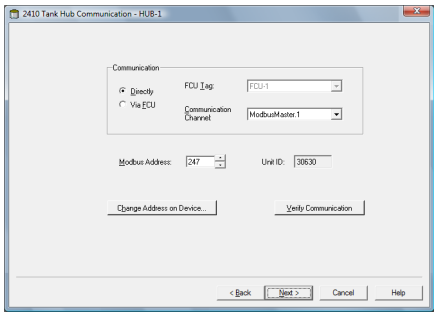
- host communication parameters for the Primary Bus
- host communication and emulation parameters for the Secondary Bus
- virtual relays
- hybrid density calculation

See the *Rosemount 2410 Reference Manual* (Document No. 300530EN) for more information on how to configure the Rosemount 2410 Tank Hub.

5.6.2 Summary of Tank Hub Installation and Configuration



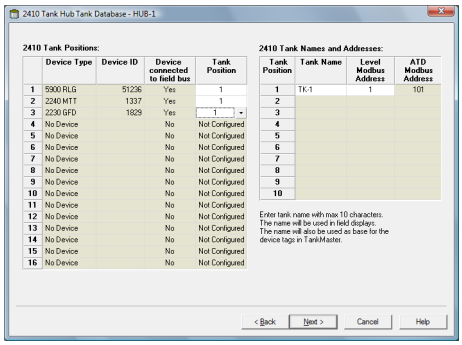
Select device type
2410 Tank Hub



Communication setup.

Choose how the 2410 connects to the TankMaster workstation.

Assign address and choose communication channel.

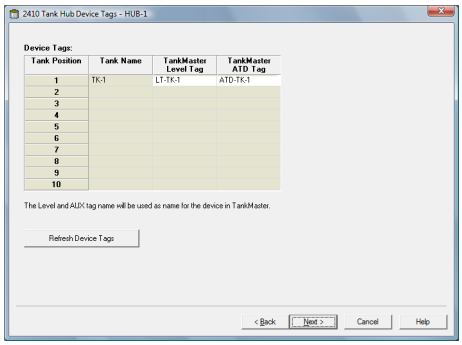


2410 Tank Database setup.

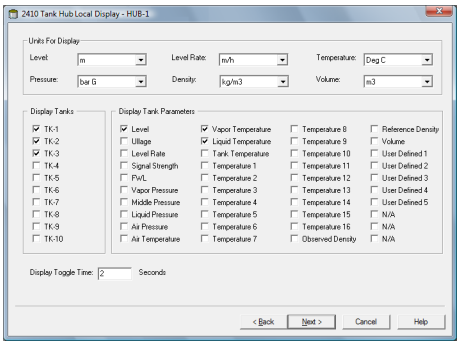
Map devices to tank position.

Specify tank name.

Assign Modbus address for level devices and ATD devices.



Enter level tags and ATD tags.

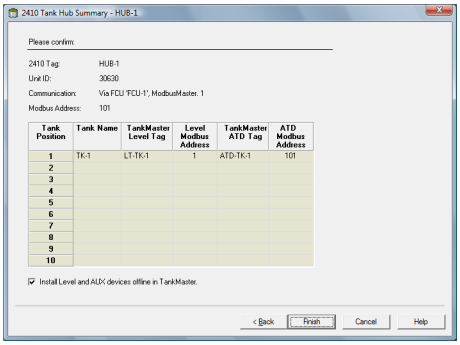


Local Display Setup.

Choose the desired measurement units for the different tank parameters.

Select tanks and parameters.

Set the display parameter toggle time.



Verify the configuration.

Choose whether the slave devices should be installed automatically in TankMaster or not.

5.7 INSTALLING A ROSEMOUNT 5900S RADAR LEVEL GAUGE

The Rosemount 5900S Radar Level Gauge is typically installed in TankMaster WinSetup as part of the Rosemount 2410 Tank Hub installation procedure. In a following step, the 5900S is configured via the *5900S RLG Properties* window, see “Configuration via the Properties Window” on page 5-52. The *5900S RLG Properties* window includes tabs for basic and advanced configuration of a Rosemount 5900S.

When adding a Rosemount 5900S Radar Level Gauge to a Rosemount 2410 Tank Hub in an existing Raptor system, the 5900S needs to be mapped to the appropriate tank in the 2410 tank database. Configuration is performed via the *5900S RLG Properties* window. See “Adding a Tank to a Raptor System” on page 5-114 for further information.

A Rosemount 5900S is most conveniently installed by utilizing the integrated option included as part of the Rosemount 2410 Tank Hub installation procedure.

The 5900S can also be installed and configured by using the WinSetup installation Wizard (see “Installing a 5900S Using the Installation Wizard” on page 5-58). This method should only be used in exceptional cases when, for example, the 5900S is connected to the Tankbus at a later stage and not available when installing the 2410 Tank Hub.

The following configuration steps are included in the 5900S Radar Level Gauge basic configuration:

- communication parameters
- antenna type
- tank geometry

Configuration of a 5900S may also include:

- Tank Scan
- Empty Tank Handling

Due to the properties of the product, the tank shape, or other circumstances, further configuration may be needed in addition to the basic configuration. Disturbing objects and turbulent conditions in the tank may also require that advanced measures are taken. The advanced configuration options include:

- Tank Environment
- Tank Shape
- Surface Echo Tracking
- Filter Settings

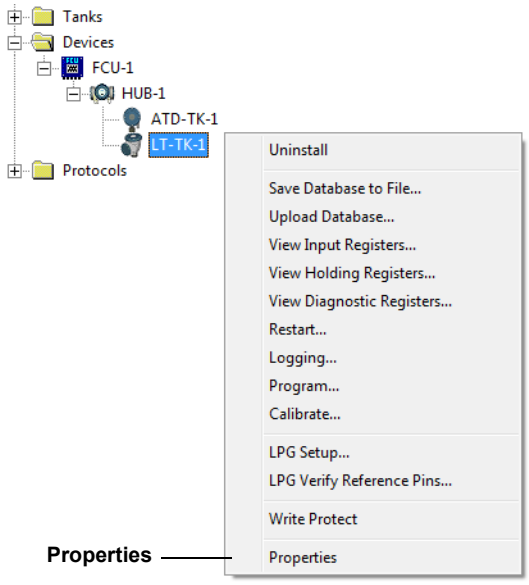
See “Advanced Configuration” on page 5-62 for further information on the advanced configuration options.

5.7.1 Configuration via the Properties Window

This section describes the basic configuration procedure of a Rosemount 5900S Radar Level Gauge through the *5900S RLG Properties* window.

For a basic configuration of the Rosemount 5900S Radar Level Gauge perform the following steps:

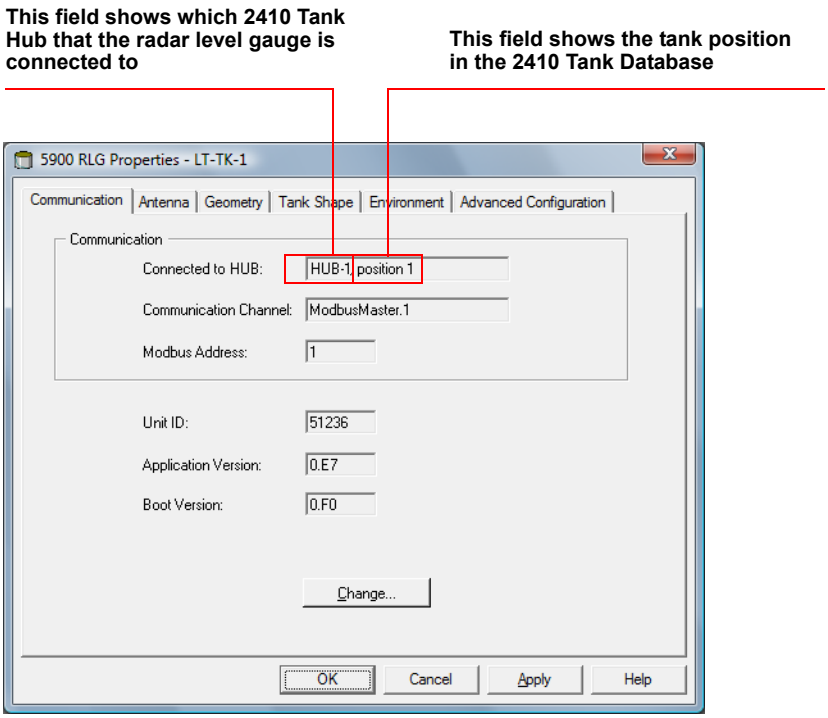
1. In the *WinSetup Workspace* window, open the **Devices** folder and select the Rosemount 5900S Radar Level Gauge.



2. Click the right mouse button and select **Properties**, or from the **Service** menu choose the **Devices/Properties** option.

   The *5900S RLG Properties* window appears.

   The Communication, Antenna, and Geometry tabs contain information for basic configuration of the Rosemount 5900S.

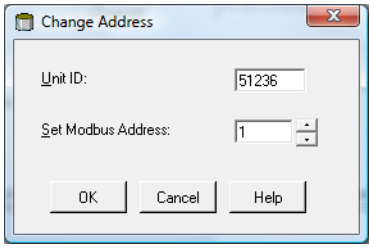


3. Select the *Communication* tab.
4. Verify the communication settings. The *Connected to HUB* field indicates which tank that the 5900S is associated with in the 2410 Tank Database. Normally, the single tank version of the Rosemount 2410 Tank Hub is used for Rosemount 5900S level gauges. In this case the *Position in 2410 HUB* field will be equal to 1 since there is only one tank position that is used in the 2410 Tank Database.

   In case the multiple tank version of the Rosemount 2410 is used to connect several tanks, the level gauge can be mapped to another tank through the *2410 Tank Hub Properties/Tank Database* window (in the WinSetup workspace, click the right mouse button on the 2410 icon and choose the Properties option).
   See “Tank Database Setup” on page 5-42 for more information on 2410 Tank Database setup.

5. Verify that the Modbus address is correct.

   To change the Modbus address click the **Change** button to open the *Change Address* window:

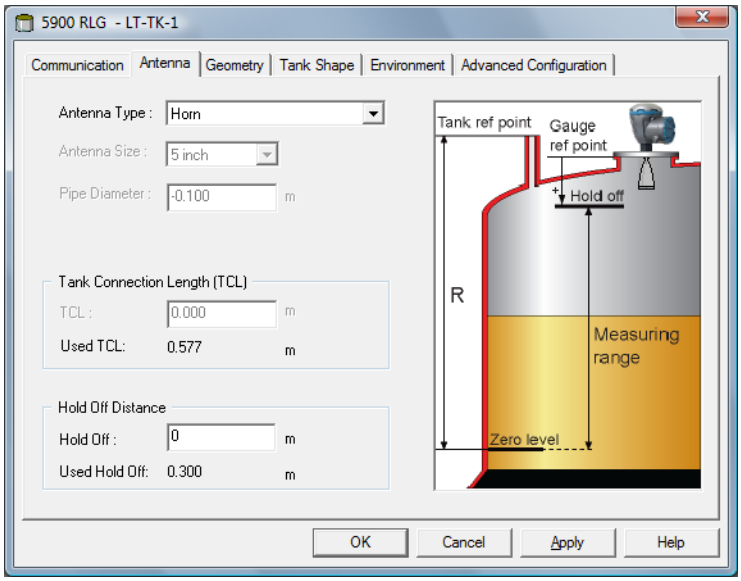


a. Enter the **Unit ID**.
When changing the device address, the Unit Id is used as an unique identifier of the device. The Unit Id can be found on a label mounted on the device.

b. Set the desired address in the **Set Modbus Address** input field.

c. Click the **OK** button to confirm the settings and to close the *Change Address* window.

6. In the *5900S RLG Properties/Communication* window click the **Apply** button to store the Modbus address in the 5900S holding register.
7. In the *5900S RLG Properties* window select the *Antenna* tab:



8. Choose one of the predefined **Antenna Types** to match the antenna attached to the 5900S Radar Level Gauge. For predefined antennas, a number of transmitter parameters such as **TCL** and **Hold Off Distance** are configured automatically in order to optimize measurement performance.
For non-standard antennas you may choose one of the User Defined antennas. However, it is recommended that you contact Emerson Process Management/Rosemount Tank Gauging for advice before using this advanced option.

The following antenna types are available:

5900S with Horn Antenna

- Horn

5900S with Parabolic Antenna

- Parabolic

5900S with Still-pipe Array Antenna

- Still-Pipe Array Fixed
- Still-Pipe Array Hatch

5900S with LPG Antenna

Depending on the pressure rating of the flange, choose one of the following options:

- LPG/LNG 150 PSI + Valve
- LPG/LNG 150 PSI
- LPG/LNG 300 PSI + Valve
- LPG/LNG 300 PSI
- LPG/LNG 600 PSI + Valve
- LPG/LNG 600

For Still-pipe Array antennas you need to specify **Antenna Size** and **Pipe Diameter**. The Pipe Diameter is used to compensate for the lower microwave propagation speed inside a still-pipe. See also “Using the Calibrate Function” on page 5-123 for information on how to calibrate the 5900S for still-pipe installations.

To configure a User Defined antenna (advanced)

The User Defined option (User Def. Free Propagation, User Def. Linear Pipe, and User Def. Modeconv. Pipe) should only be used in special situations for non-standard antennas:

a. Choose the appropriate antenna type:
   - User Defined Free Propagation
   - User Defined Pipe
   - User Defined Pipe Array

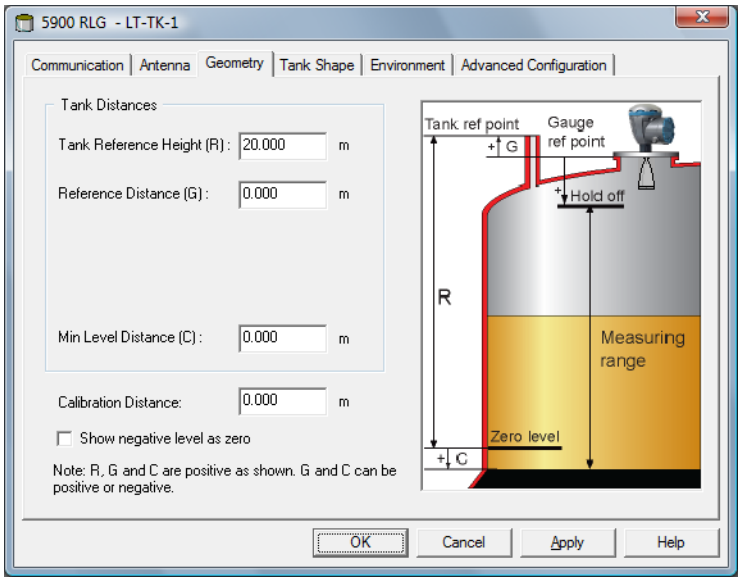
b. Enter the **Tank Connection Length** in the **TCL** input field.

c. For still pipe applications, type the inner diameter of the still pipe in the **Pipe Diameter** input field.

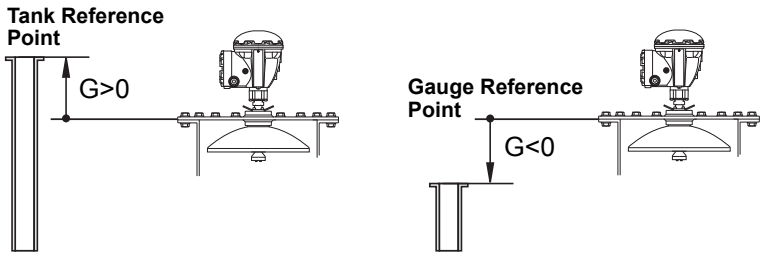
d. In case there are disturbances close to the nozzle you may need to adjust the **Hold Off Distance**. By increasing the Hold Off distance, the measurement range is reduced in the upper part of the tank.

9. In the *5900S RLG Properties/Antenna* window click the **Apply** button to save the configuration.
   See *Rosemount 5900S Reference Manual* (Document No. 300520EN) for more information on *Hold Off Distance* and other level gauge parameters.

10. In the *5900S RLG Properties* window select the *Geometry* tab:



11. Enter the tank geometry parameters:
    a. **Tank Reference Height (R)**
    The Tank Reference Height (R) is the distance from the hand dip nozzle (Tank Reference Point) to the Zero Level (Datum Plate) close to the bottom of the tank.
    b. **Reference Distance (G)**
    The Reference Distance (G) is the distance between the Tank Reference Point and the Gauge Reference Point, which is located at the upper surface of the nozzle flange or manhole cover on which the gauge is mounted.
    G is positive if the Tank Reference Point is located above the Gauge Reference Point, otherwise G is negative.



When using a 5900S with Still-pipe Array Antenna and hinged hatch, the Gauge Reference Point is located at the hand-dip mark inside the hatch (see the *Rosemount 5900S Reference Manual,* Document No. 300520EN, for more information).

c. **Minimum Level Distance (C)**
The Minimum Level Distance (C) is defined as the distance between the Zero Level (Dipping Datum Point) and the minimum level (tank bottom) for the product surface.
By specifying a C-distance the measuring range can be extended to the bottom of the tank.

C>0: the 5900S presents negative level values when the product surface is below the Zero Level.
You can use the **Show negative level values as zero** check box if you wish to present product levels below the Zero Level (Datum plate) as equal to zero.
C=0: measurements below the Zero Level will not be approved, i.e. the RLG will report “invalid level” if the product level is below the Datum Plate.

12. **Enter the Calibration Distance**.
Use this variable to adjust the tank height so that measured product levels match hand dipped levels. Normally a minor adjustment is necessary when the level gauge is installed. For example, a minor deviation between the actual tank height and the value stored in the transmitter database may occur if tank dimensions according to drawings are not quite up to date with actual dimensions.

For **still-pipe** applications the **Calibrate** function in the TankMaster WinSetup program is a useful tool to configure the Calibration Distance and the Correction Factor, see “Level Gauge Calibration” on page 5-122 for more information.

13. Click the **OK** button to save the configuration and close the configuration window.

In addition to the configuration steps described above, a basic configuration of the 5900S may include using the Tank Scan function to verify that there are no disturbing objects in the tank that may interfere with the level measurements. Also, the Empty Tank Handling function may be used to optimize measurement performance near the tank bottom.

See “Basic Configuration” in the *Rosemount 5900S Reference Manual* (Document No. 300520EN) for more information.

Further configuration options are available in the *Tank Shape, Environment*, and *Advanced Configuration* tabs, see “Advanced Configuration” on page 5-62.

5.7.2 Installing a 5900S Using the Installation Wizard

The installation wizard in TankMaster WinSetup is a tool that may be used to install and configure a Rosemount 5900S Radar Level Gauge and other devices.

However, in most cases the following procedure is recommended when installing a new Rosemount 5900S gauge:

1. Add the new 5900S Radar Level Gauge to the **Rosemount 2160 FCU Slave Database**. Ensure that the correct Modbus address is configured (see “Installing a Rosemount 2160 FCU” on page 5-25 for more information).
2. Configure the **Tank Database** in the *2410 Tank Hub Properties/ Tank Database* window, (see “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information).
3. Install the 5900S in TankMaster via the *2410 Tank Hub Properties/ Device Tags* window.
4. Configure the 5900S (see “Configuration via the Properties Window” on page 5-52).

See also “Adding a Tank to a Raptor System” on page 5-114 for further information on adding tanks and devices to a Raptor system.

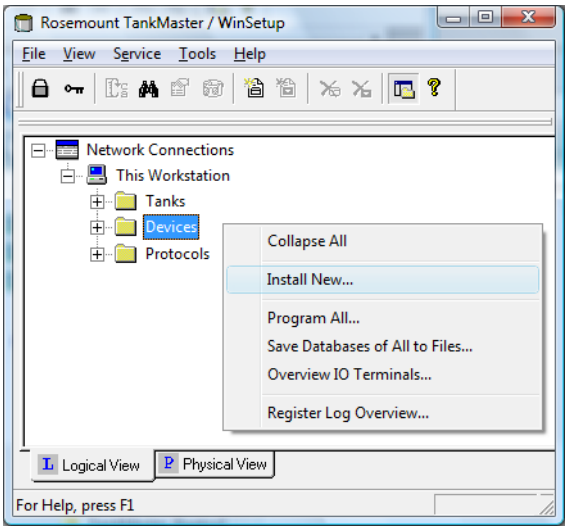
In case the recommended installation procedure as described above can not be used, the installation wizard offers an alternative method to install a new Rosemount 5900S level gauge in TankMaster. In this case do the following:

1. Configure the Rosemount 2160 **Slave Database** by including the new 5900S Radar Level Gauge. Ensure that the correct Modbus address is configured (see “Installing a Rosemount 2160 FCU” on page 5-25 for more information).
2. Configure the Rosemount 2410 **Tank Database** in the *2410 HUB Properties/Tank Database* window, (see “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information).
3. Install and configure the Rosemount 5900S as described in “Using the installation wizard” on page 5-59.

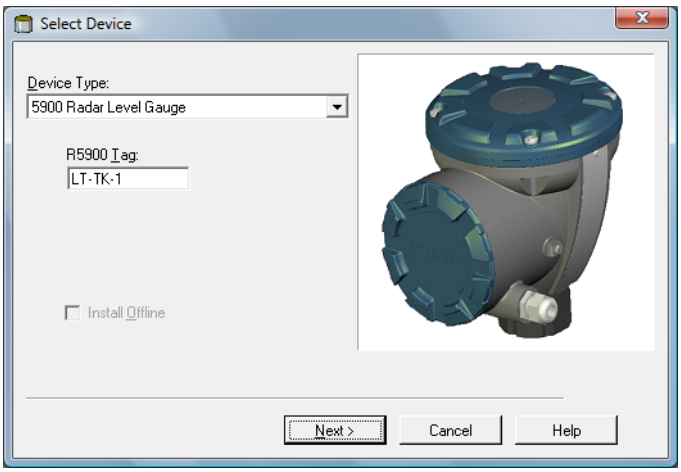
Using the installation wizard

To configure a Rosemount 5900S by using the WinSetup installation wizard perform the following steps:

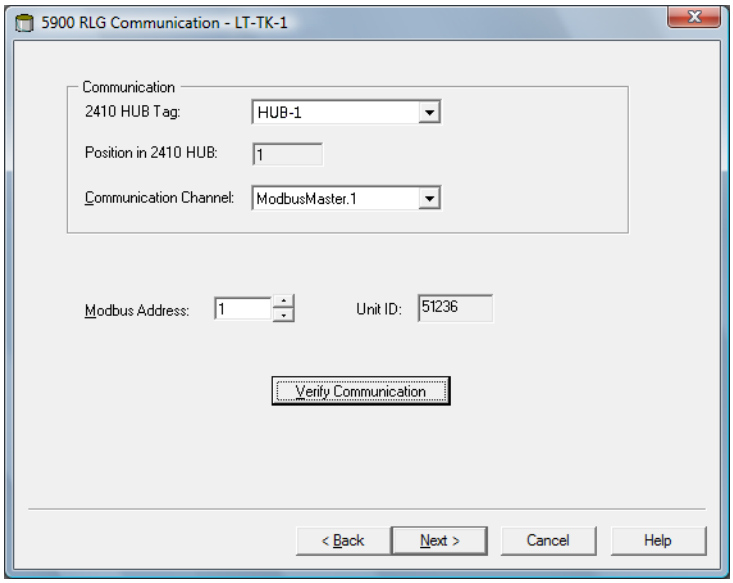
1. In the *Workspace* window select the **Devices** folder.



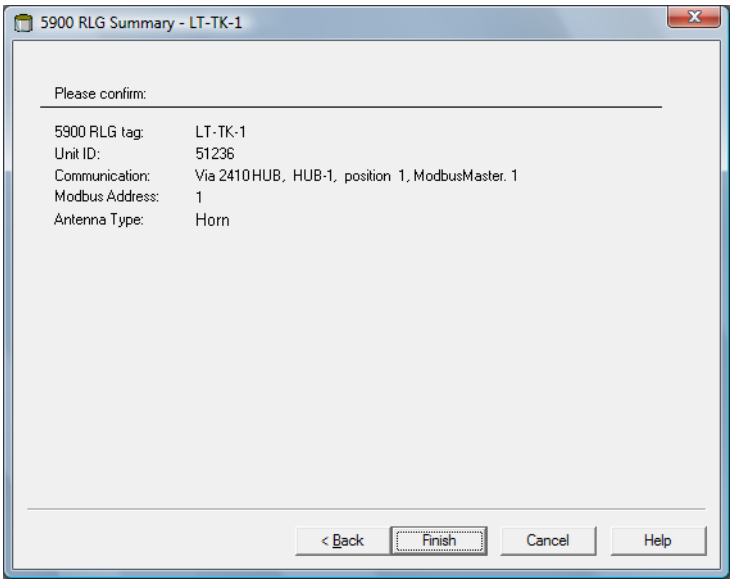
2. Click the right mouse button and select **Install New**, or from the **Service** menu choose **Devices/Install New**.
   The *Select Device* window appears:



3. Choose **Device Type** *5900S Radar Level Gauge* from the drop-down list.
4. Enter the level tag to be used to identify the 5900S.
5. Click the **Next** button to open the *5900S RLG Communication* window:



6. In the 2410 Tank HUB Tag drop-down list choose the Rosemount 2410 Tank Hub that the 5900S Radar Level Gauge is connected to. Normally, there is one 2410 for each tank equipped with a 5900S Radar Level Gauge.
7. Enter the **Modbus address** that is used for the 5900S Radar Level Gauge. This address must also be stored in the 2160 FCU Slave Database as well as in the 2410 Tank Database.
8. Click the **Verify Communication** button to verify that the TankMaster PC communicates with the 5900S Radar Level Gauge. The Unit ID will appear when contact is established.
9. Check the *Position in 2410 HUB* field to verify that the 5900S is mapped to the correct tank position in the 2410 tank database. Normally, the single tank version of the Rosemount 2410 Tank Hub is used for Rosemount 5900S level gauges. In this case the *Position in 2410 HUB* field will be equal to 1 since there is only one tank position that is used in the 2410 Tank Database.
   In case the multiple tank version of the 2410 Tank Hub is used to handle several tanks, the level gauge can be mapped to the desired tank via the *2410 Tank Hub Properties/Tank Database* window (in the WinSetup workspace, click the right mouse button on the 2410 icon and choose the Properties option).
   See “Tank Database Setup” on page 5-42 for more information on 2410 Tank Database setup.
10. Click the **Next** button to proceed with the 5900S configuration.
11. For descriptions of the *5900S RLG Antenna* and the *5900S RLG Geometry* windows, refer to the appropriate parts in chapter “Configuration via the Properties Window” on page 5-52.



12. In the *5900S RLG Summary* window click the **Finish** button to verify the configuration and finish the installation wizard. In case the configuration needs to be changed, click the **Back** button until the desired window appears.

See “Basic Configuration” in the *Rosemount 5900S Reference Manual* (Document No. 300520EN) for more information.

Further configuration options are available in the *5900S RLG Properties* window, see “Advanced Configuration” on page 5-62

5.7.3 Advanced Configuration

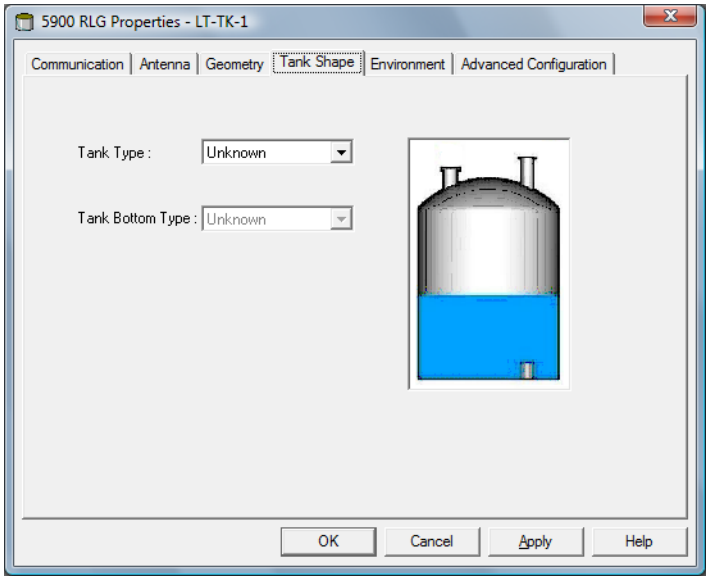
In addition to the basic configuration, there are advanced configuration options available for the Rosemount 5900S Radar Level Gauge. These may be used to optimize measurement performance for certain applications.

Tank Shape

The **Tank Type** and **Tank Bottom Type** parameters optimize the Rosemount 5900S for various tank geometries and for measurements close to the tank bottom.

To configure the 5900S Radar Level Gauge for a certain tank shape, do the following:

1. In the *5900S RLG Properties* window select the *Tank Shape* tab:



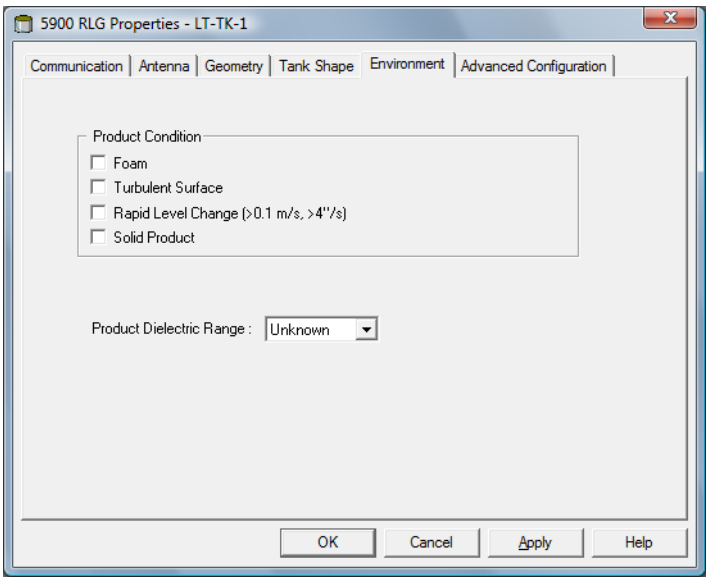
2. Select a **Tank Type** option that matches the actual tank. Choose *Unknown* if there is no option that is applicable.
3. Select **Tank Bottom Type** that matches the actual tank. Choose *Unknown* if there is no option that is applicable.
4. Click the **OK** button to save the configuration and close the window.

Tank Environment

Certain tank conditions may require additional configuration of the 5900S Radar Level Gauge in order to optimize measurement performance. By considering environmental conditions in the tank, the 5900S can compensate for conditions such as rapid level change, weak echo signals, or varying surface echo amplitudes.

To configure the 5900S Radar Level Gauge for special tank conditions:

1. In the *5900S RLG Properties* window select the *Environment* tab:



2. Select the check boxes that correspond to the conditions in the tank. Use as few options as possible. It is recommended that no more than two options are used simultaneously.
3. Choose the **Product Dielectric Range** from the drop-down list. Choose the *Unknown* option if the correct value range is unknown or if the contents of the tank is changing on a regular basis.
4. Click the **OK** button to save the configuration and close the window.

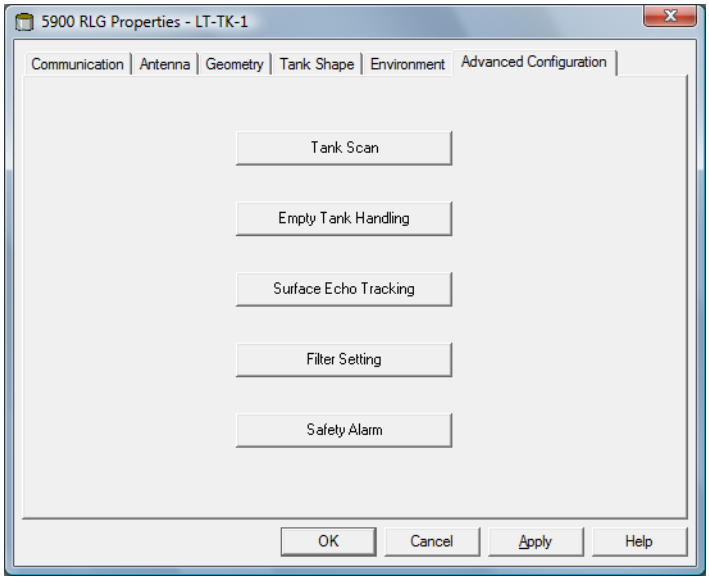
See the *Rosemount 5900S Reference Manual* (Document No. 300520EN) for more information on tank environment settings.

The Advanced Configuration Tab

The *Advanced Configuration* tab provides further configuration options. The following options are available:

- **Tank Scan**(1)
- **Empty Tank Handling**(1)
- **Surface Echo Tracking**
- **Filter Settings**
- **Safety Alarm** (only used for SIL safety systems)

Figure 5-10. The *5900S RLG Properties/Advanced Configuration* window



For information on the *Advanced Configuration* tab features, see the *Rosemount 5900S Reference Manual* (Document no. 300520EN).

(1) May also be used in Basic configuration.

5.8 INSTALLING AUXILIARY TANK DEVICES

Auxiliary Tank Devices (ATDs) such as the Rosemount 2240S Multi-input Temperature Transmitter and the Rosemount 2230 Graphical Field Display, are typically installed as part of the installation procedure of the Rosemount 2410 Tank Hub. The ATD devices appear in the TankMaster workspace and are configured via the *22XX ATD* window.

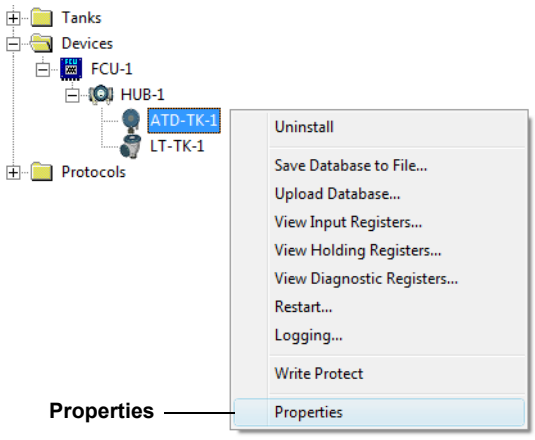
The *22XX ATD* window includes tabs for configuration of temperature sensors, graphical field displays, and water level sensors. It also includes configuration options for mapping measurement variables such as Free Water Level and Liquid Pressure to the outputs of measurement instruments such as water level sensors, pressure sensors etc.

Before starting the ATD installation, read the reference manuals for the various ATD devices, such as the Rosemount 2240S and the Rosemount 2230, to learn more about how to configure these devices.

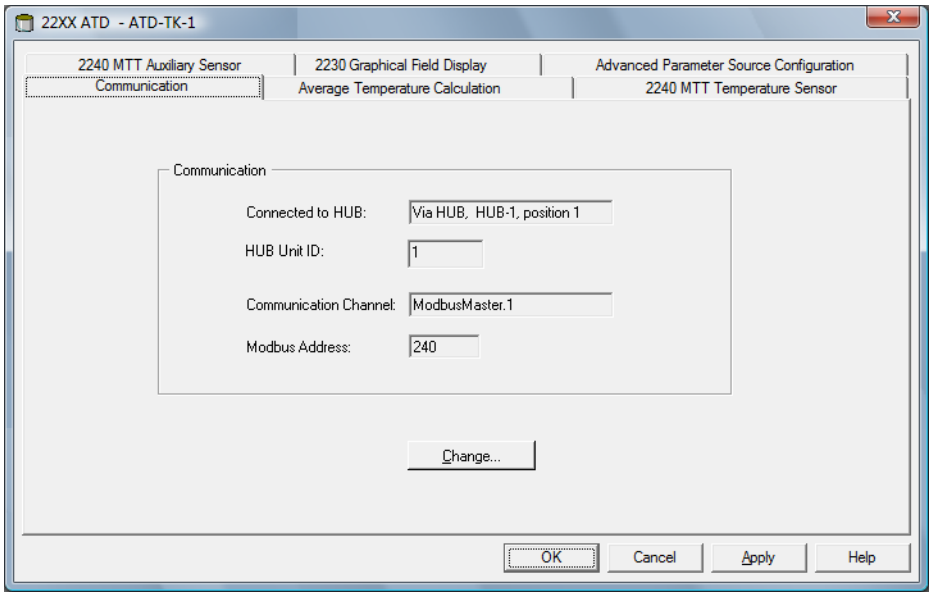
5.8.1 Opening the Properties Window

To open the *22XX ATD* window and to configure the ATD devices do the following:

1. In the *WinSetup Workspace* window, open the **Devices** folder and select the ATD device icon.



2. Click the right mouse button and select **Properties**, or from the **Service** menu choose the **Devices/Properties** option.
The *22XX ATD* window appears:

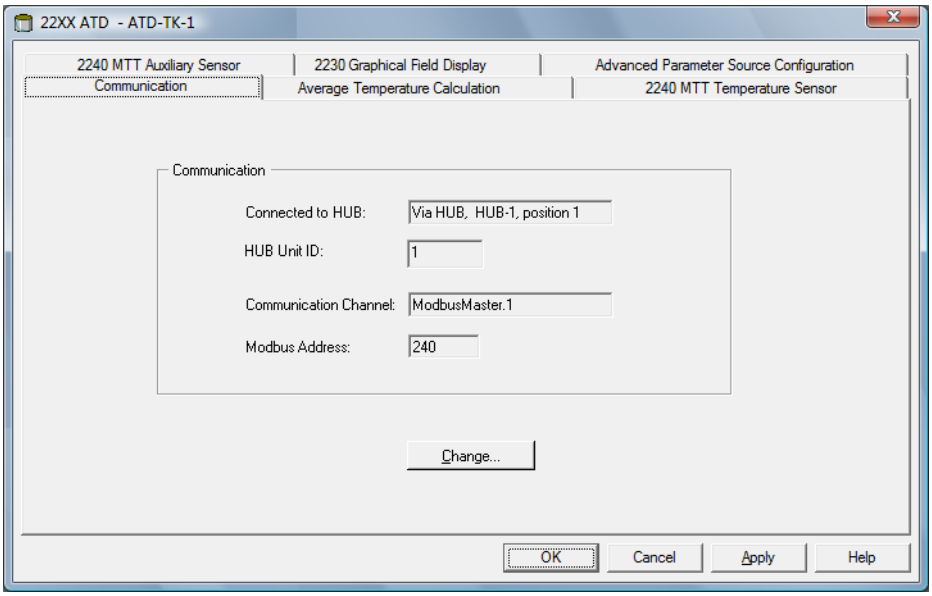


3. The *22XX ATD* window includes basic and advanced configuration tabs. Configure the ATD devices (Rosemount 2240S Multi-input Temperature Transmitter, Rosemount 2230 Graphical Field Display) by choosing the appropriate tabs. See descriptions of the different configuration tabs on the following pages.

5.8.2 Communication Parameter Setup

The *Communication* tab lets you verify the ATD communication settings.

1. In the *22xx ATD* window select the *Communication* tab:



2. In the *Connected to HUB* field verify that the ATD device is connected to the correct 2410 Tank Hub and mapped to the correct tank position in the 2410 tank database.
   For example, “position 1” means that the ATD device is mapped to tank database position 1, “position 2” to tank database position 2 etc.
   You can check the tank database of the current 2410 Tank Hub by opening the *2410 HUB Properties/Tank Database* window. See “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information on the 2410 Tank Database.
3. The **Change** button lets you change the Modbus address of the current ATD device in case the ATD device is connected to a multiple tank version of the 2410 Tank Hub.
   Note that the Modbus address can only be changed for ATD devices in tank database position 2 and higher. An ATD device mapped to position 1 in the 2410 tank database uses the same Modbus address as the 2410 Tank Hub itself. See “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information.
4. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

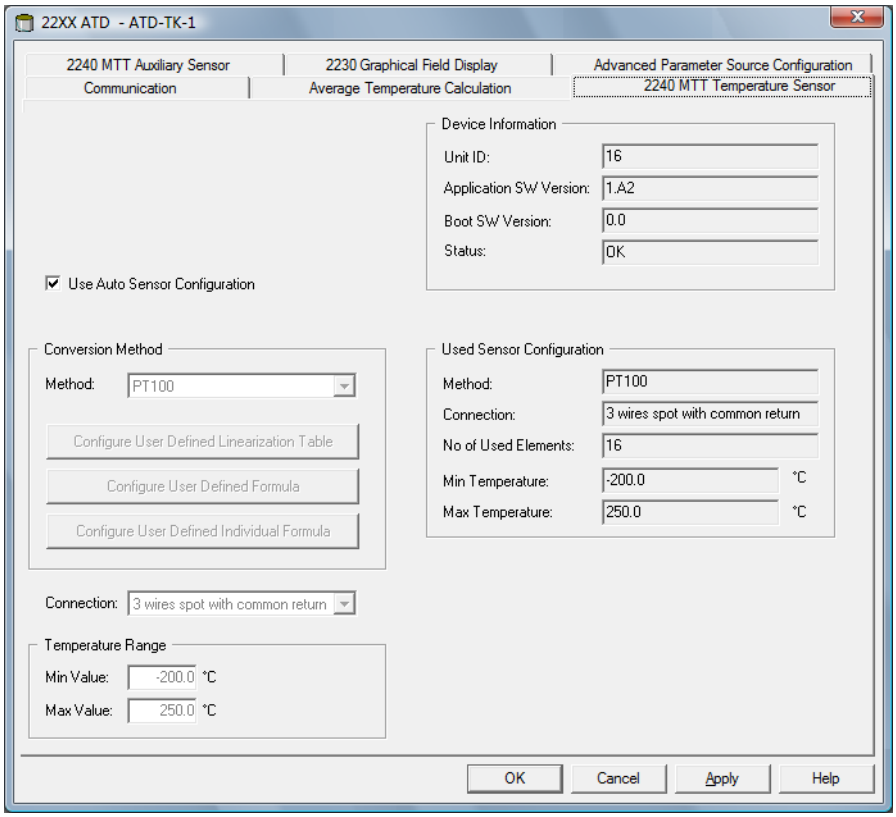
5.8.3 Temperature Sensor Configuration

The *2240S MTT Temperature Sensor* tab lets you configure a sensor connected to the Rosemount 2240S Multi-input Temperature Transmitter.

The *2240S MTT Temperature Sensor* tab input fields are disabled in case no 2240S Multi-input Temperature Transmitter is connected to the Tankbus. In that case, no 2240S temperature transmitter will be mapped to the 2410 tank database.

To configure the temperature sensors for a Rosemount 2240S, do the following:

1. In the *22xx ATD* window select the *2240S MTT Temperature Sensor* tab:



2. The Rosemount 2240S is equipped with a DIP switch that automatically configures the 2240S for a certain kind of temperature element and wiring. By selecting the **Use Auto Sensor Configuration** check box, the 2240S transmitter is automatically configured according to the DIP switch settings. See the *Rosemount 2240S Multi-Input Temperature Transmitter Reference Manual* (Document No. 300550EN) for more information.

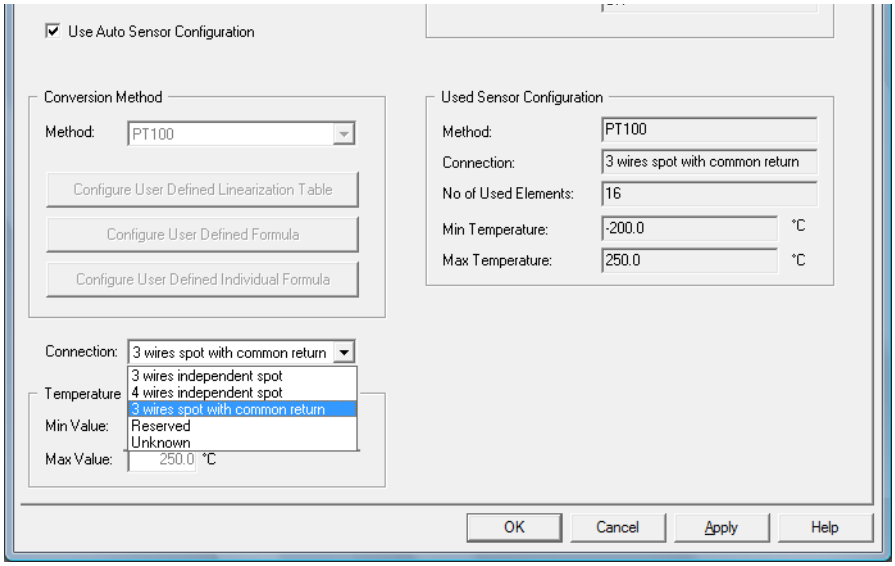
   In case a temperature element type is used that does not match the Auto Sensor Configuration, the 2240S transmitter can be manually configured as described below.

Manual Configuration

1. Ensure that the **Use Auto Sensor Configuration** check box is unchecked.
2. Choose conversion method in the **Method** input field.
   For more information on conversion methods such as *User defined table*, *User defined formula* and *User defined individual formula*, see the appropriate sections in *"User Defined Temperature Conversion" on page 7-4.*

NOTE
For Spot and Multiple Spot Temperature elements, use the Spot Pt100 sensor option in order to obtain a correct average temperature calculation.

3. Specify the measurement range of the current temperature element by specifying the minimum and maximum temperatures in the **Min Value** and **Max Value** input fields.
4. Choose the type of sensor connection that is used for the spot sensors in the **Connection** drop-down list.



5. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

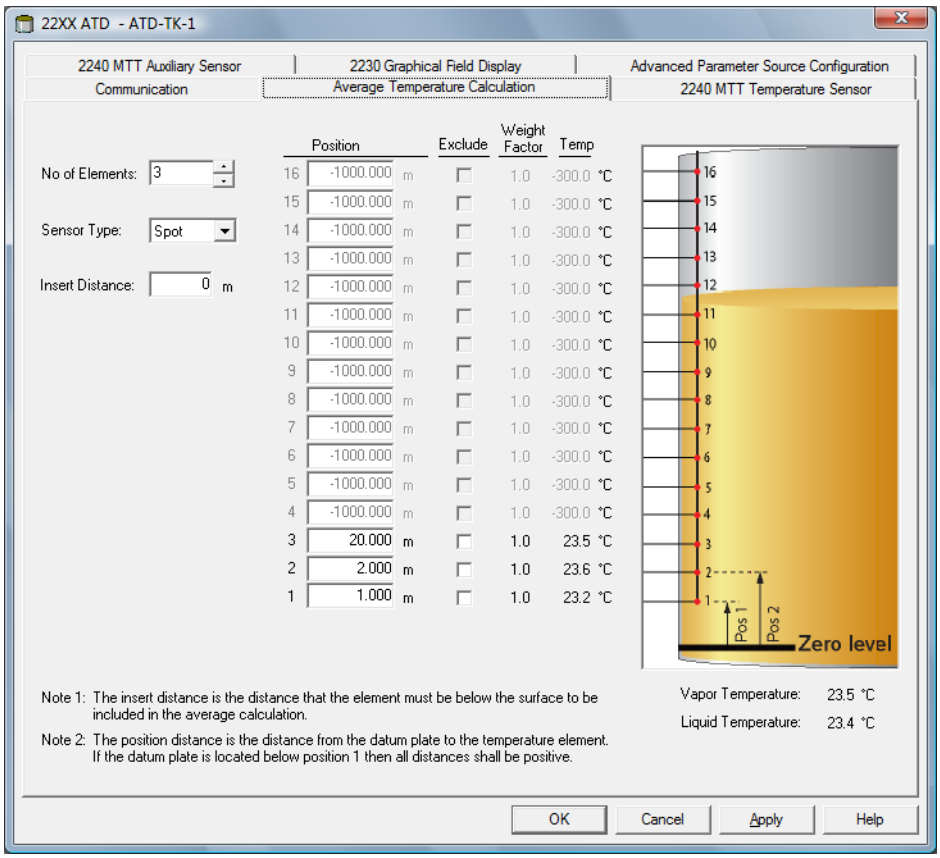
See the *Rosemount 2240S Multi-Input Temperature Transmitter Reference Manual* (Document No. 300550EN) for more information on how to configure temperature sensors for the Rosemount 2240S.

5.8.4 Average Temperature Calculation

This section gives a brief description of how to configure average temperature calculations for a temperature sensor connected to the Rosemount 2240S Multi-input Temperature Transmitter. See the *Rosemount 2240S Multi-Input Temperature Transmitter Reference Manual* (Document No. 300550EN) for more information.

To configure a Rosemount 2240S for average temperature calculations, do the following:

1. In the *22xx ATD* window, choose the *Average Temperature Calculation* tab:



2. In the **No of Elements** input field, select the number of used temperature elements. Verify that the input fields for element positions are enabled.
3. In the **Sensor Type** drop-down list, choose the type of sensor that is used; Spot or Average.
4. In the **Insert Distance** input field, specify the minimum distance between a temperature sensor and the product surface for temperature sensors included in average temperature calculation.
5. In the **Position** column, type the position of each temperature element measured as the distance from the Zero Level to the temperature element.
   If average temperature elements are used, enter the position of the terminating level of each sensor element.

6. You may exclude a certain temperature element from the average temperature calculation by selecting the **Exclude** check box in the column next to the Position field. This option may be useful in case you would like to exclude a malfunctioning temperature element.
7. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

See the *Rosemount 2240S Multi-Input Temperature Transmitter Reference Manual* (Document No. 300550EN) for more information on how to configure the Rosemount 2240S for average temperature calculations.

5.8.5 Auxiliary Sensor Configuration

The *2240S MTT Auxiliary Sensor* tab lets you configure a water level sensor connected to a *Rosemount 2240S* Multi-input Temperature Transmitter.

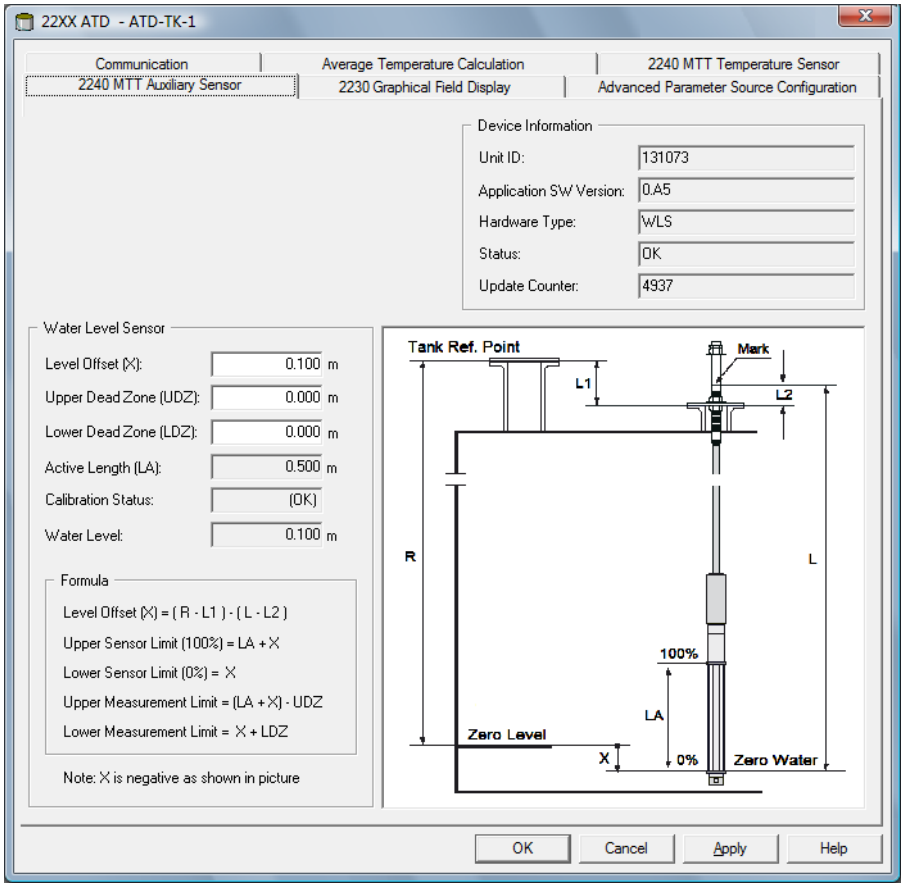
All input fields in the *2240S MTT Auxiliary Sensor* tab will be disabled if no 2240S Multi-input Temperature Transmitter is associated with the current tank position in the tank database of the 2410 Tank Hub.

Water Level Sensor

This section gives a brief description of how to configure a water level sensor connected to the *Rosemount 2240S* Multi-input Temperature Transmitter. See the *Rosemount 2240S Multi-Input Temperature Transmitter Reference Manual* (Document No. 300550EN) for further information.

To configure the water level sensor do the following:

1. In the *22xx ATD* window, select the *2240S MTT Auxiliary Sensor* tab:



2. Calculate the **Level Offset (X)** according to the formula *X=(R-L1)-(L-L2)*.

3. Enter the resulting level offset value in the **Level Offset (X)** input field.
4. Enter the **Upper Dead Zone (UDZ)** and the **Lower Dead Zone (LDZ)** if needed.
   See the *Rosemount 2240S Multi-Input Temperature Transmitter Reference Manual* (Document No. 300550EN) for more information on how to configure these parameters.
5. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

See the *Rosemount 2240S Multi-Input Temperature Transmitter Reference Manual* (Document No. 300550EN) for more information on how to configure a water level sensor connected to a Rosemount 2240S Multi-input Temperature Transmitter.

5.8.6 Advanced Parameter Source Configuration

The *Advanced Parameter Source Configuration* tab lets you map the output of various measurement instruments (source devices) to tank measurement variables such as Liquid Pressure and Vapor Pressure. That makes the measurement variables available for configuration in the *Tank Configuration* window as described in “Installing a New Tank” on page 5-103.

Tank measurement variables such as Level, Vapor Temperature, and Free Water Level are automatically mapped to source devices and do not need to be mapped in the *Advanced Parameter Source Configuration* tab.

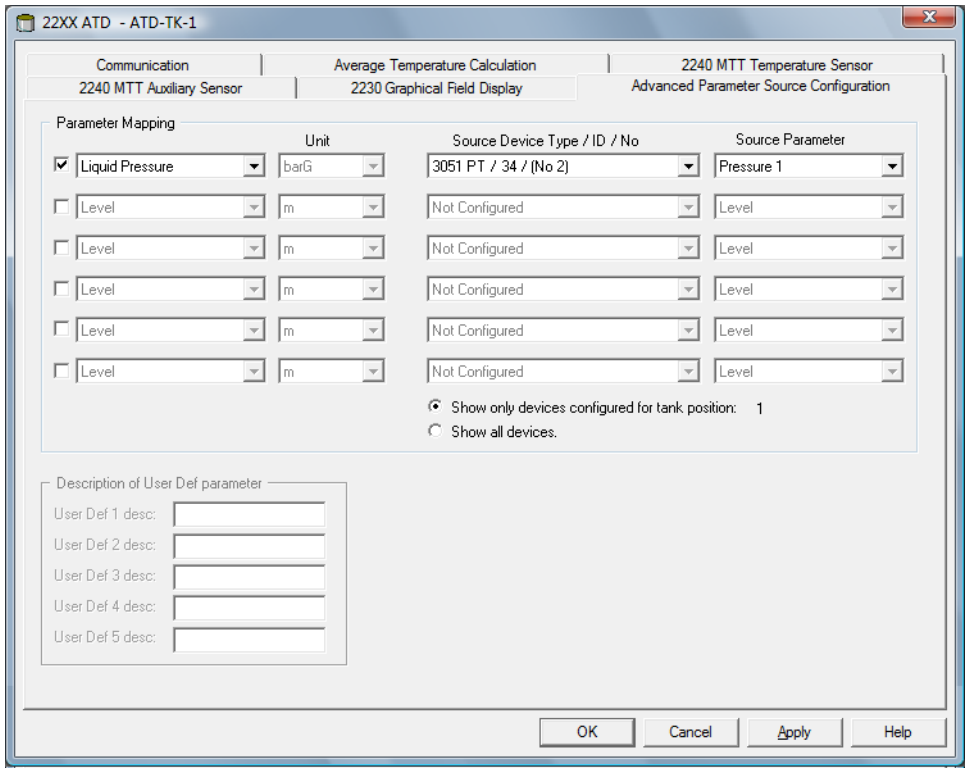
The Rosemount 2410 Tank Hub supports 60 source parameter mappings. Six mappings are reserved for each one of the ten 2410 tank positions.

NOTE
A warning message will appear in case a certain parameter/source mapping is already used for another tank.

For a source device to be available in the *Advanced Parameter Source Configuration* tab, it must be mapped to the current tank in the 2410 tank database (see “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information).

To map parameters to source devices, perform the following steps:

1. In the *22xx ATD* window, select the *Advanced Parameter Source Configuration* tab:



2. In the *Parameter Mapping* column choose a tank measurement variable.

3. In the *Source Device Type/ID/No* column, choose a measurement device such as a pressure transmitter or any other type of instrument.

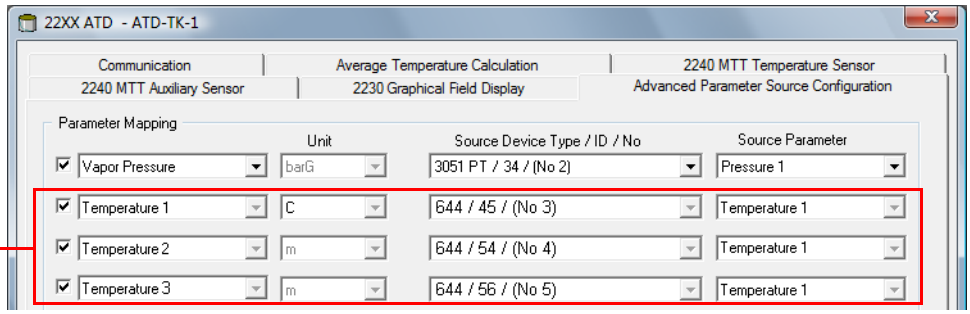
   The default setting lists only the devices mapped to the current tank position in the 2410 tank database. By using this option you will avoid mapping to a device on the wrong tank by mistake.

   You can choose to show all available devices, or only the devices mapped to the current tank in the 2410 tank database by selecting the appropriate radio button.

4. In the *Source Parameter* column, select the transmitter variable to be mapped to the tank measurement variable in the first column.
   In case *User Defined* is selected, you may type a description in the *Description of User Def parameter* box.
5. When using a Rosemount 2240S Multi-input Temperature Transmitter, the Raptor system automatically handles mapping of source parameters to provide correct input for calculation of tank measurement variables such as **Vapor Temperature** and **Average Temperature**.

   For Rosemount 644 Temperature Transmitters, tank variables have to be mapped manually to the appropriate 644 source devices. The output from each 644 transmitter on the tank is mapped to a temperature tank variable as shown in the following example with three 644 transmitters on the tank:

Configuration of 644 Temperature Transmitters



   a. Choose *Temperature 1* in the Parameter Mapping list for the first 644 Temperature Transmitter.
      For the second and third 644 transmitters, choose *Temperature 2* and *Temperature 3* in the Parameter Mapping list.
   b. In the Source Device Type field, for each temperature parameter (*Temperature 1, 2, 3*) choose the actual 644 transmitter to be used as source device.
   c. In the Source Parameter list, choose *Temperature 1*. This is the source parameter designation of the temperature output from a Rosemount 644 Temperature Transmitter.

   Note that the actual Vapor Temperature and Average Temperature variables are not mapped to the source devices.
6. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

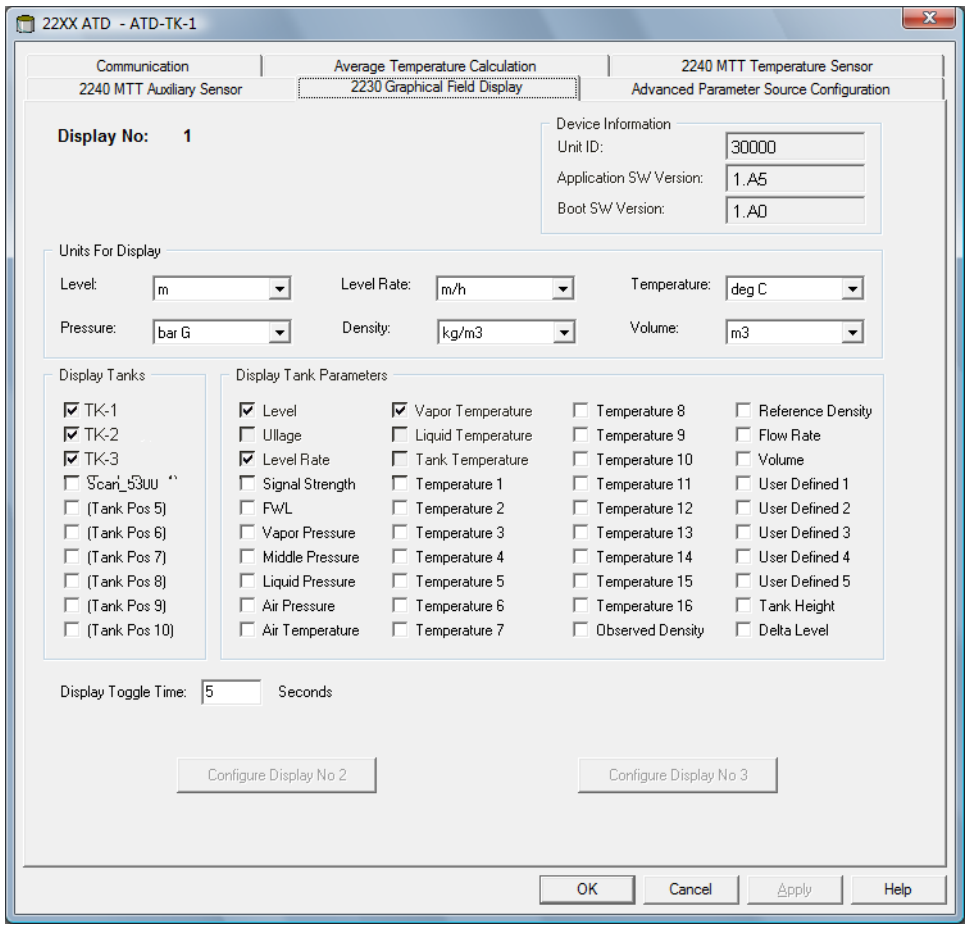
5.8.7 2230 Graphical Field Display

This section gives a brief description of how to configure a Rosemount 2230 Graphical Field Display.

All fields in the *2230 Graphical Field Display* tab are disabled if no graphical field display is associated with the current tank. The **Configure Tank Display 2** and **Configure Tank Display 3** buttons are disabled if only one Rosemount 2230 is mapped to the current tank database position of the Rosemount 2410 Tank Hub.

To configure the 2230 Graphical Field Display, do the following:

1. In the *22xx ATD* window, select the *2230 Graphical Field Display* tab:



2. From the drop-down lists in the *Units for Display* pane, choose the desired measurement units to be used by the Rosemount 2230 for the various tank measurement variables.
3. In the *Display Tanks* box, choose the tanks to present in the Rosemount 2230 display by selecting the appropriate check boxes.
4. In the *Display Tank Parameters* pane, choose the parameters to be displayed for each tank by selecting the appropriate check boxes.
5. Enter the toggle time for the displayed tank parameters in the **Display Toggle Time** input field. The selected parameters will be displayed for one tank at a time starting with Tank 1.

6. If a second graphical field display is used, click the **Configure Tank Display No 2** button and repeat step 1 through 4 above.
7. If a third graphical field display is used, click the **Configure Tank Display No 3** button and repeat step 1 through 4 above.
8. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

See the *Rosemount 2230 Graphical Field Display Reference Manual* (Document No. 300560EN) for more information on how to configure a Rosemount 2230 Graphical Field Display.

5.9 INSTALLING A ROSEMOUNT 5400

The Rosemount 5400 Radar Level Transmitter is most conveniently installed in TankMaster WinSetup by utilizing the integrated option included as part of the Rosemount 2410 Tank Hub installation procedure. In a following step, the 5400 is configured via the *5400 RLT* window, see “Configuration via 5400 Properties” on page 5-79. The *5400 RLT* window includes tabs for basic and advanced configuration of a Rosemount 5400 transmitter.

When adding a Rosemount 5400 to a Rosemount 2410 Tank Hub in an existing Raptor system, the 5400 needs to be mapped to the appropriate tank in the 2410 tank database. Configuration is performed via the *5400 RLT* window. See “Adding a Tank to a Raptor System” on page 5-114 for further information.

The 5400 can also be installed and configured by using the WinSetup installation Wizard (see “Installing a 5400 Using the Installation Wizard” on page 5-84). This method should only be used in exceptional cases when, for example, the 5400 is connected to the Tankbus at a later stage and not available when installing the 2410 Tank Hub.

The following configuration steps are included in the Rosemount 5400 radar level transmitter basic configuration:

- communication parameters
- antenna type
- tank geometry

Due to properties of the product, tank shape, or other circumstances, further configuration may be needed in addition to the basic configuration. Disturbing objects and turbulent conditions in the tank may also require advanced measures to be taken. The TankMaster WinSetup configuration tool includes advanced options for the 5400 such as:

- tank environmental conditions
- tank shape

See “Advanced Configuration” on page 5-88 for further information on advanced configuration options.

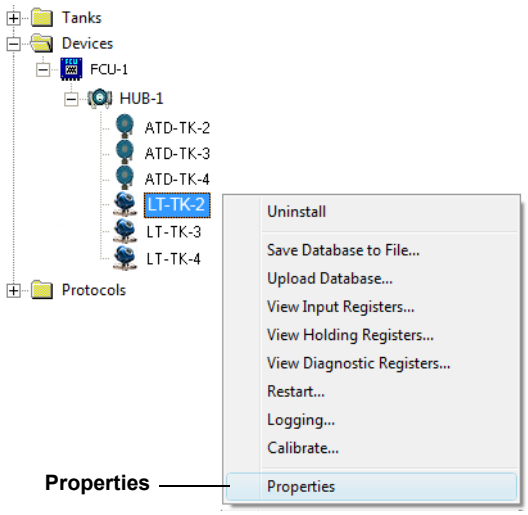
For further information on how to install and configure a Rosemount 5400 Radar Level Transmitter see the *Rosemount 5400 Reference Manual (Document No. 00809-0100-4026).*

5.9.1 Configuration via 5400 Properties

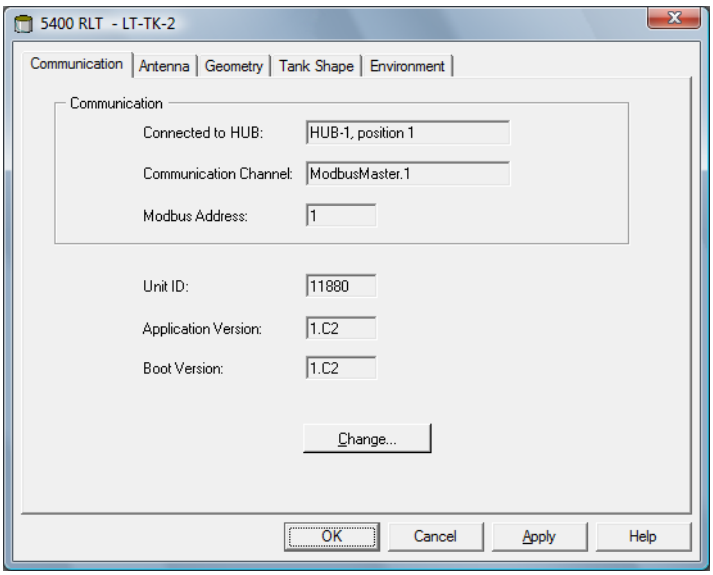
This section describes the basic configuration procedure for a Rosemount 5400 series radar transmitter by using the *5400 RLT* window.

To configure the Rosemount 5400 Radar Level Transmitter perform the following steps:

1. In the *WinSetup Workspace* window, open the **Devices** folder and select the desired Rosemount 5400 transmitter.

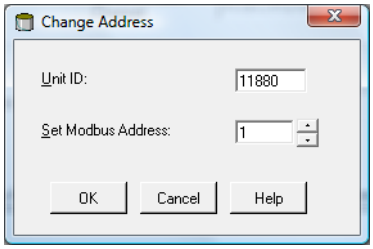


2. Click the right mouse button and select **Properties**, or from the **Service** menu choose the **Devices/Properties** option. The *5400 RLT* window appears:



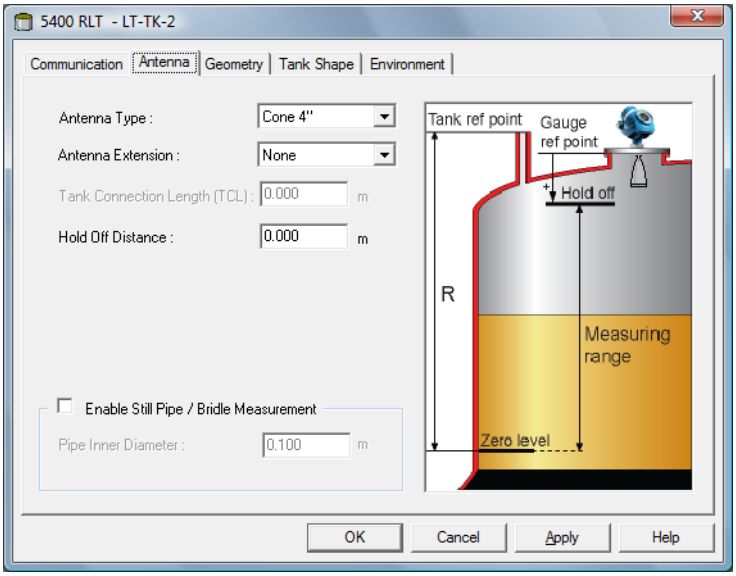
3. Select the *Communication* tab

4. Verify the tank position. The *Connected to HUB* field shows the name of the 2410 Tank Hub and the tank position that the 5400 is mapped to in the 2410 tank database. The tank position indicates which tank the 5400 is associated with.
   In case the 5400 transmitter is connected to a multiple tank version of the Rosemount 2410, the 5400 may be mapped to another tank position via the *2410 Tank Hub Properties/Tank Database* window if needed (in the WinSetup workspace, click the right mouse button on the 2410 icon and choose the Properties option).
   See “Tank Database Setup” on page 5-42 for more information on how to configure the 2410 Tank Database.
5. Verify that the Modbus address is correct. To change the Modbus address click the **Change** button:



   a. Enter the Unit ID in the **Unit ID** input field.
      When changing the device address, the Unit Id is used as a unique identifier of the device. The Unit Id can be found on a label mounted on the device.
   b. Set the desired address in the **Set Modbus Address** input field.
   c. Click the **OK** button to confirm the settings and to close the *Change Address* window.
6. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

7. Select the *Antenna* tab.



8. Chose **Antenna Type**. It is possible to choose between predefined antenna types or User Defined for non-standard antennas. For a predefined antenna a number of transmitter parameters such a Tank Connection Length (TCL) and **Hold Off Distance** are automatically specified in order to optimize measurement performance. When choosing a User Defined antenna the database settings must be entered manually.

   Choose one of the following antenna types:

   Free Propagation

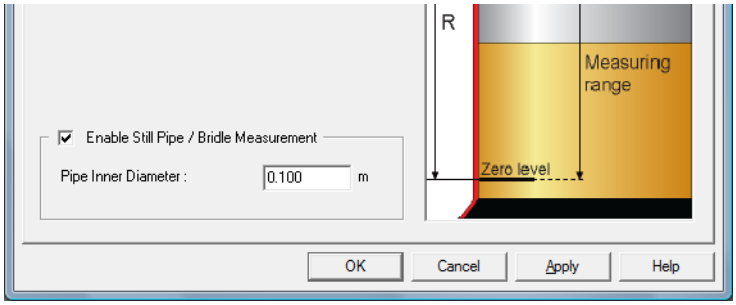
   - Cone 4 inch

   Still-pipes

   - Cone 2 inch
   - Cone 3 inch
   - Cone 4 inch

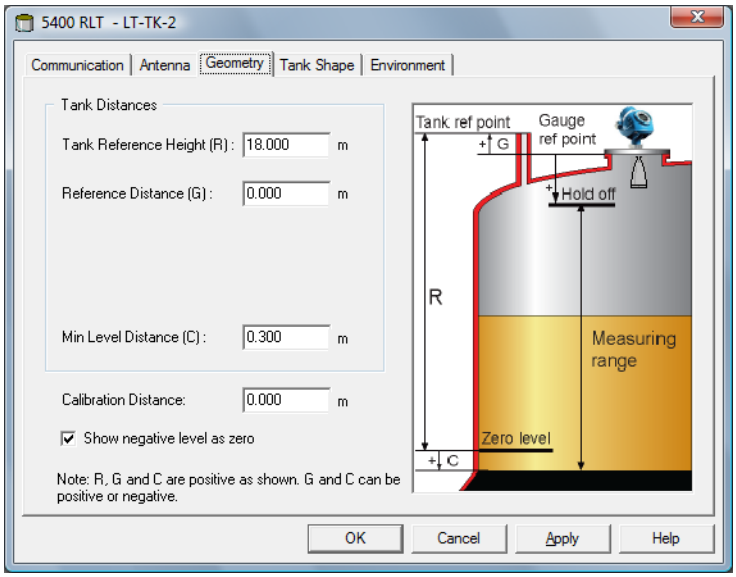
9. Choose **Antenna Extension** length in case the antenna is equipped with an extension.
10. Adjust the **Hold Off Distance (UFM)** if there are disturbances close to the nozzle. By increasing the Hold Off distance, the measurement range is reduced in the upper part of the tank.

11. For still pipe applications select the **Enable still pipe/Bridle Measurements** check box and enter the **Pipe Inner Diameter**.



See the *Rosemount 5400 Reference Manual (Document No. 00809-0100-4026)* for more information on *Hold Off Distance* and other transmitter parameters.

12. Click the **Apply** button to store the configuration.
13. Select the *Geometry* tab.



14. Enter the tank distance parameters.
    a. **Tank Reference Height (R)**.
    The Tank Reference height (R) is defined as the distance from the Tank Reference Point to the Zero Level.
    b. **Reference Distance (G)**.
    The Reference Distance (G) is the distance between the Tank Reference Point and the Gauge Reference Point, which is located at the top surface of the nozzle flange on which the gauge is mounted.

c. **Minimum Level Distance (C)**. The Minimum Level Distance (C) is defined as the distance between the Zero Level (Dipping Datum Point) and the minimum level for the product surface (tank bottom). By specifying a C-distance, the measuring range can be extended to the bottom of the tank.

   C>0: the transmitter presents negative level values when the product surface is below the Zero Level.
   You can use the **Show negative level values as zero** check box to present product levels below the Zero Level (Datum plate) as equal to zero.

   C=0: measurements below the Zero Level will not be approved, i.e. the transmitter will report “invalid level” if the product level is below the Datum Plate.

15. Enter the **Calibration Distance**. Use this variable to adjust the tank height so that measured product levels match hand dipped levels. Normally a minor adjustment is necessary when the transmitter is installed. For example, a minor deviation between the actual tank height and the value stored in the transmitter database may occur if tank dimensions according to drawings are not quite up to date with actual dimensions.
16. Select the **Show negative level as zero** check box to show negative product levels as zero.
17. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

See the *Rosemount 5400 Reference Manual (Document No. 00809-0100-4026)* for more information on the different tank geometry parameters.

5.9.2 Installing a 5400 Using the Installation Wizard

The installation wizard in TankMaster WinSetup is a tool that may be used to install and configure a Rosemount 5400 Radar Level Transmitter and other devices.

However, in most cases the following procedure is recommended when installing a new Rosemount 5400 transmitter:

1. Configure the Rosemount 2160 FCU **Slave Database** by including the new 5400 transmitter. Ensure that the correct Modbus address is configured (see “Installing a Rosemount 2160 FCU” on page 5-25 for more information).
2. Configure the Rosemount 2410 **Tank Database** in the *2410 Tank Hub Properties/Tank Database* window, (see “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information).
3. Install the 5400 in TankMaster via the *2410 Tank Hub Properties/Device Tags* window.
4. Configure the 5400 (see “Configuration via 5400 Properties” on page 5-79).

See also “Adding a Tank to a Raptor System” on page 5-114 for further information on adding tanks and devices to a Raptor system.

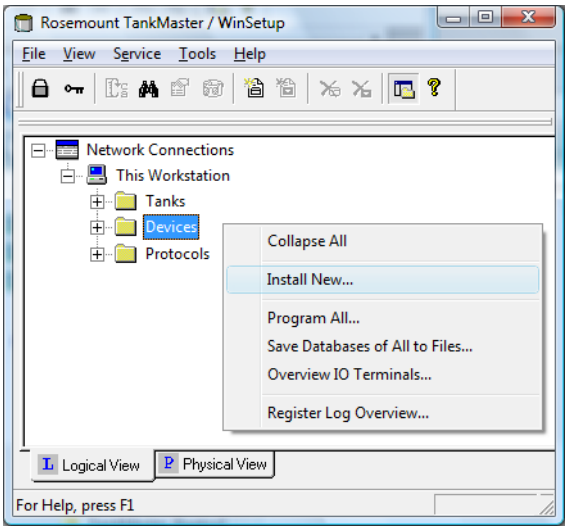
In case the recommended installation procedure as described above can not be used, the installation wizard offers an alternative method to install a new Rosemount 5400 Radar Level Transmitter in TankMaster. In this case do the following:

1. Configure the Rosemount 2160 FCU **Slave Database** by including the new 5400 transmitter. Ensure that the right Modbus address is configured (see “Installing a Rosemount 2160 FCU” on page 5-25 for more information).
2. Configure the Rosemount 2410 **Tank Database** in the *2410 Tank Hub Properties/Tank Database* window, (see “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information).
3. Install and configure the Rosemount 5400 as described in “Using the installation wizard” on page 5-85.

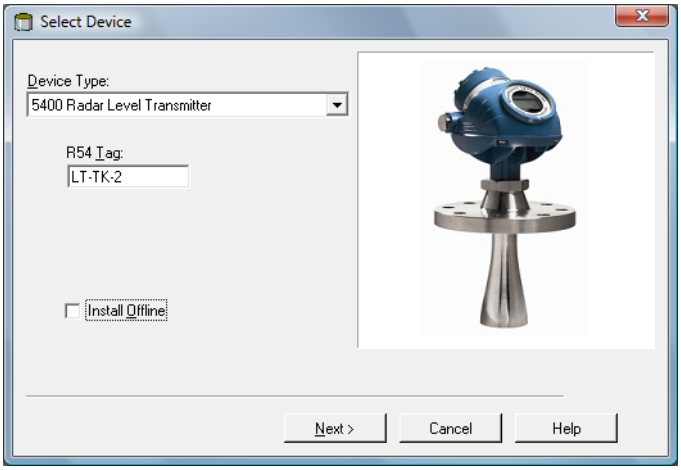
Using the installation wizard

To configure a Rosemount 5400 by using the WinSetup installation wizard perform the following steps:

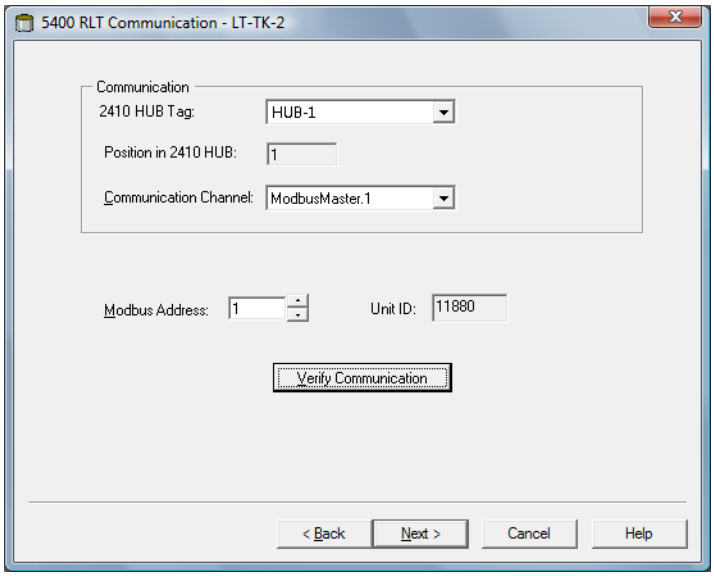
1. In the *Workspace* window select the **Devices** folder.



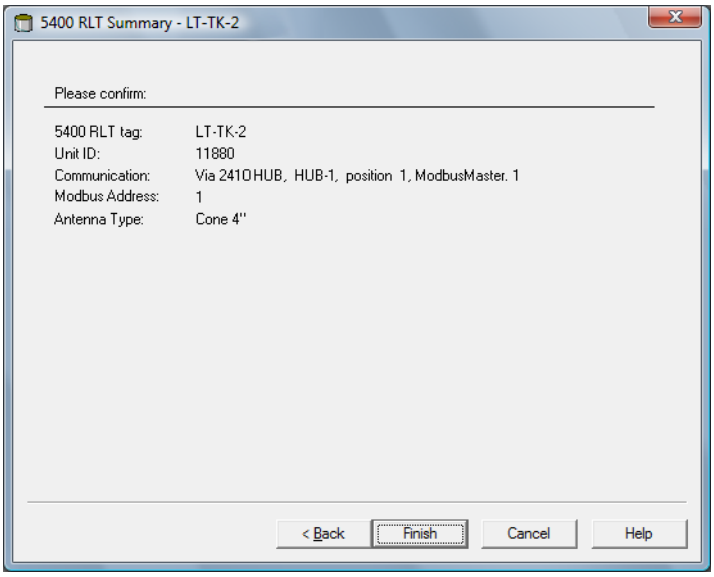
2. Click the right mouse button and select **Install New**, or from the **Service** menu choose **Devices/Install New**.
   The *Select Device* window appears:



3. Choose **Device Type** *5400 Radar Level Transmitter* from the drop-down list.
4. Enter the level tag used for the radar level gauge.
5. Click the **Next** button to open the *5400 RLT Communication* window.



6. In the *2410 HUB Tag* drop-down list choose the Rosemount 2410 Tank Hub that the 5400 Radar Level Transmitter is connected to.
7. Enter the **Modbus address** that is used for the 5400 level transmitter. Note that this address must be stored in the 2160 FCU Slave Database as well as in the 2410 Tank Database.
8. Click the **Verify Communication** button to verify that the TankMaster PC communicates with the 5400 transmitter. The Unit ID will appear when contact is established.
9. Verify the tank position. The *Position in 2410 HUB* field shows the tank position that the 5400 is mapped to in the 2410 tank database. The tank position indicates which tank the 5400 is associated with. In case the 5400 transmitter is connected to a multiple tank version of the Rosemount 2410, the 5400 can be mapped to another tank position via the *2410 Tank Hub Properties/Tank Database* window if necessary(in the WinSetup workspace, click the right mouse button on the 2410 icon and choose the Properties option).
See “Tank Database Setup” on page 5-42 for more information on how to configure the 2410 Tank Database.
10. Click the **Next** button to proceed with the 5400 configuration.
11. For configuration of the *5400 RLT Antenna* and the *5400 RLT Geometry* windows refer to the appropriate parts of the description in “Configuration via 5400 Properties” on page 5-79.
12. For configuration of the *5400 RLT Tank Shape* and the *5400 RLT Environment* windows, refer to the appropriate parts of the description in “Advanced Configuration” on page 5-88.



13. In the *5400 RLT Summary* window, click the **Finish** button to finish the installation wizard. If the configuration needs to be changed click the **Back** button until the desired window appears..

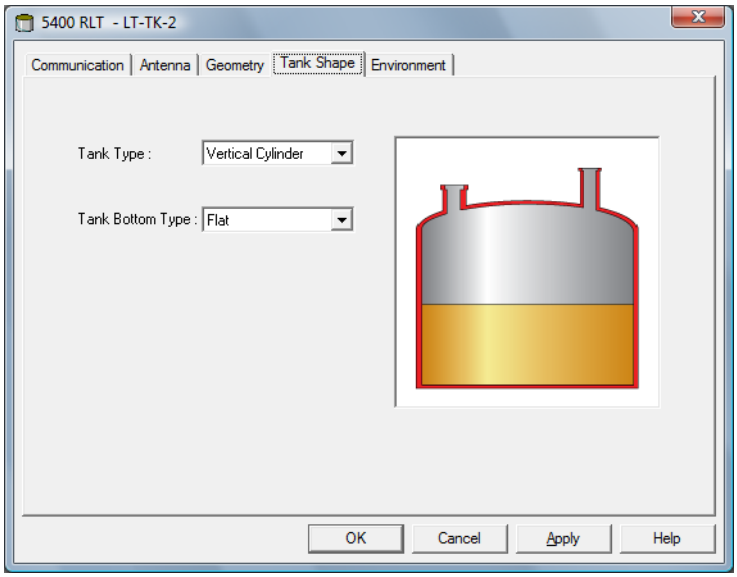
Further configuration options are available in the *5400 RLT* window, see “Advanced Configuration” on page 5-88.

5.9.3 Advanced Configuration

In addition to the basic configuration there are some advanced configuration options available for the Rosemount 5400 transmitter.

Tank Shape

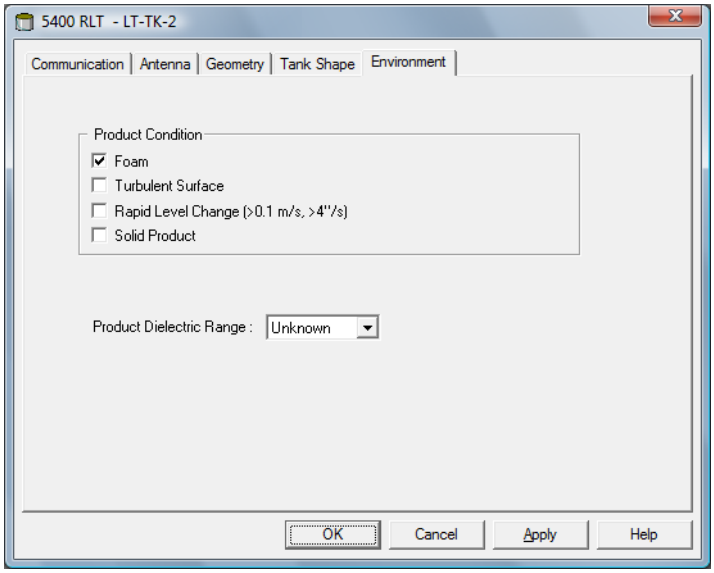
The **Tank Type** and **Tank Bottom Type** parameters optimize the Rosemount 5400 for various tank geometries and for measurements close to the tank bottom. These parameters are configured in the *5400 RLT/Tank Shape* window:



Tank Environment

Certain product conditions in the tank may require special configuration options to be used in order to optimize measurement performance of the 5400 Radar Level Transmitter. By configuring the environmental conditions in the tank, the 5400 can compensate for conditions such as rapid level change, weak echo signals, varying surface echo amplitudes, or other similar sources of inaccurate measurement.

The *5400 RLT/Environment* window is used to optimize the 5400 radar transmitter for special tank conditions:



Product Condition options are set by selecting check boxes for the appropriate tank conditions. It is recommended to select as few options as possible and not more than two.

The **Product Dielectric Range** can be set from the drop-down list. Choose the *Unknown* option if the correct value range is unknown or if the contents of the tank is changing on a regular basis.

See the *Rosemount 5400 Reference Manual (Document No. 00809-0100-4026)* for more information on tank environment settings.

5.10 INSTALLING A ROSEMOUNT 5300

The Rosemount 5300 Guided Wave Radar is most conveniently installed in TankMaster WinSetup by utilizing the integrated option included as part of the Rosemount 2410 Tank Hub installation procedure. In a following step, the 5300 is configured via the *5300 GWR* window, see “Configuration via 5300 Properties” on page 5-91. The *5300 GWR* window includes tabs for basic and advanced configuration of a Rosemount 5300.

When adding a Rosemount 5300 to a Rosemount 2410 in an existing Raptor system, the 5300 needs to be mapped to the appropriate tank in the 2410 tank database. Configuration is performed via the *5300 GWR* window. See “Adding a Tank to a Raptor System” on page 5-114 for further information.

A Rosemount 5300 is most conveniently installed by utilizing the integrated option included as part of the Rosemount 2410 Tank Hub installation procedure.

The 5300 can also be installed and configured by using the WinSetup installation Wizard (see “Installing a 5300 Using the Installation Wizard” on page 5-95). This method should only be used in exceptional cases when, for example, the 5300 is connected to the Tankbus at a later stage and not available when installing the 2410 Tank Hub.

The following configuration steps are included in the basic configuration of a Rosemount 5300 Guided Wave Radar:

- communication parameters
- probe type
- tank geometry

Due to the properties of the product, the shape of the tank, or other circumstances, further configuration may be needed in addition to the basic configuration. Disturbing objects and turbulent conditions in the tank may also require advanced measures to be taken. The TankMaster WinSetup configuration tool includes advanced options for the 5300 such as:

- tank environmental conditions

See “Advanced Configuration” on page 5-99 for further information on advanced configuration options.

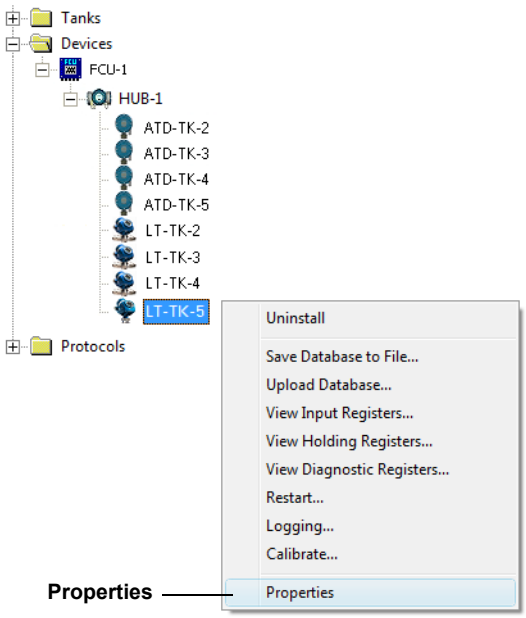
For further information on installation and configuration of a Rosemount 5300 Guided Wave Radar see the *Rosemount 5300 Reference Manual (Document No. 00809-0100-4530).*

5.10.1 Configuration via 5300 Properties

This section describes the basic configuration procedure for a Rosemount 5300 Guided Wave Radar by using the *5300 GWR window*.

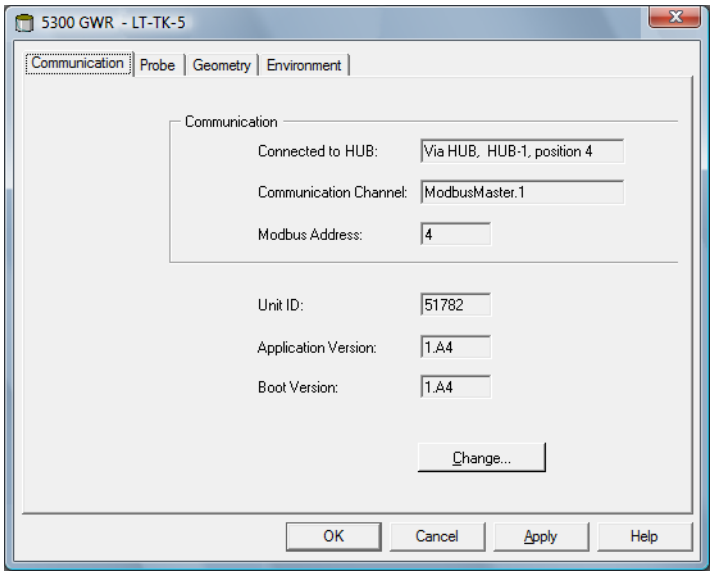
To configure the Rosemount 5300 Guided Wave Radar perform the following steps:

1. In the *WinSetup Workspace* window, open the **Devices** folder and select the desired Rosemount 5300.

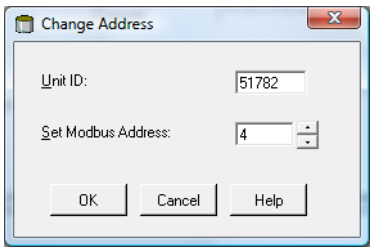


2. Click the right mouse button and select **Properties**, or from the **Service** menu choose the **Devices/Properties** option.
   The *5300 GWR window* appears.

3. Select the *Communication* tab.

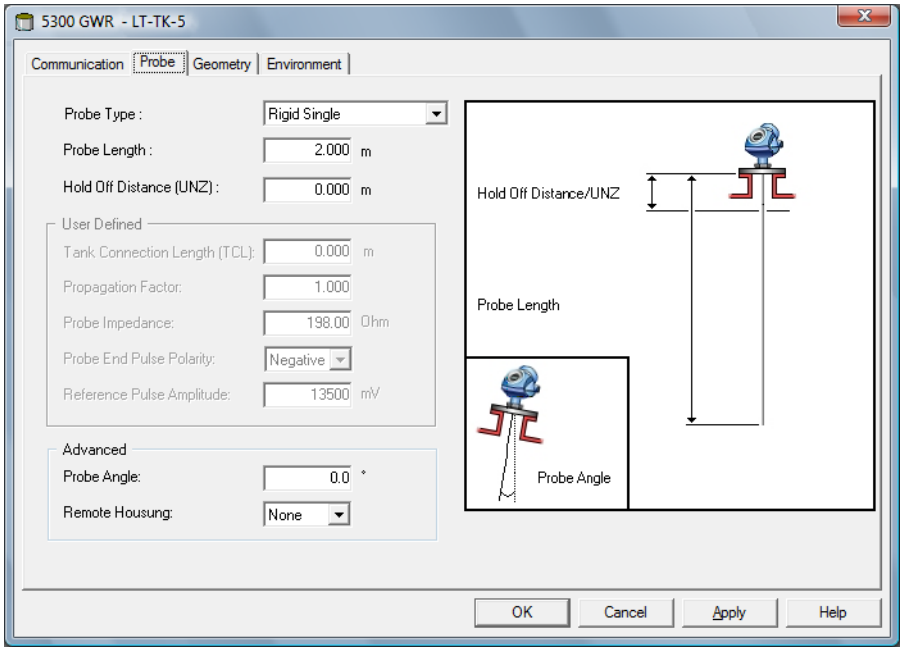


4. Verify the position in the tank database. The *Connected to HUB* field shows the name of the 2410 Tank Hub and the tank position that the 5300 is mapped to in the 2410 tank database. The tank position indicates which tank the 5300 is associated with.
   In case the 5300 radar is connected to a multiple tank version of the Rosemount 2410, the 5300 may be mapped to another tank position via the *2410 Tank Hub Properties/Tank Database* window if necessary (in the WinSetup workspace, click the right mouse button on the 2410 icon and choose the Properties option).
   See “Tank Database Setup” on page 5-42 for more information on how to configure the 2410 Tank Database.
5. Verify that the Modbus address is correct. To change the Modbus address click the **Change** button.



   a. Enter the Unit ID in the **Unit ID** input field.
      When changing the device address, the Unit Id is used as a unique identifier of the device. The Unit Id can be found on a label mounted on the device.
   b. Set the desired address in the **Set Modbus Address** input field.
   c. Click the **OK** button to confirm the settings and to close the *Change Address* window.
6. Click the **Apply** button to store the configuration.

7. Select the *Probe* tab.



8. Choose a **Probe Type** that corresponds to the probe that is used on the 5300. It is possible to choose a predefined (standard) probe, or User Defined for non-standard probes. When using a predefined probe type, measurement performance is optimized by automatically specifying various device parameters. For a User Defined probe the database settings must be configured manually.

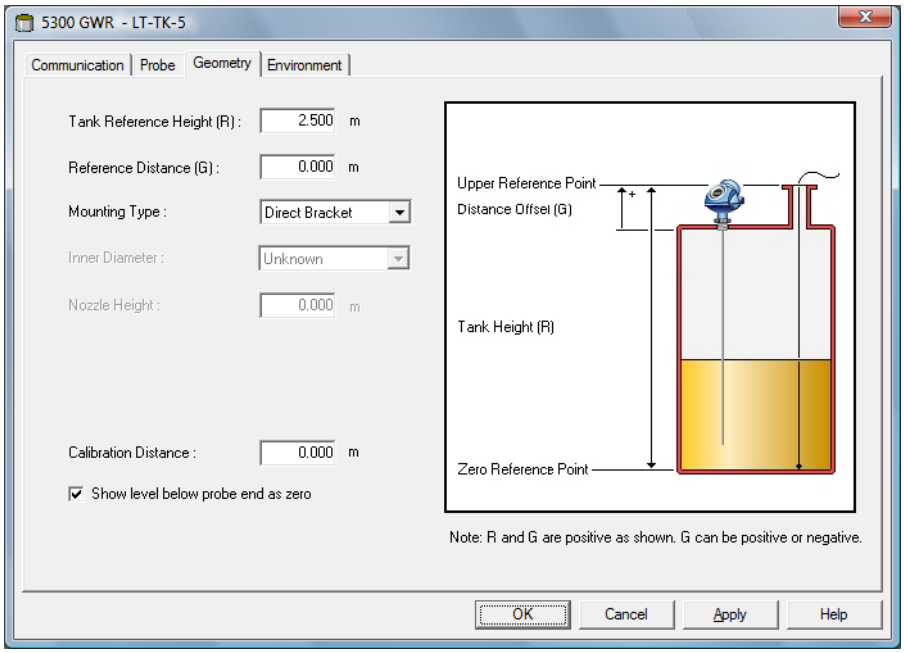
   The following predefined (standard) **Probe Types** are available:

   - Flexible Twin
   - Flexible Single
   - Coaxial

9. Specify the **Probe Length**. The Probe Length is measured from the Upper Reference Point to the end of the probe. If a weight is used at the end of the probe it shall not be included. See the *Rosemount 5300 Reference Manual* for more information.
10. Adjust the **Hold Off Distance (UNZ)** if there are disturbances in the upper part of the tank. Such problems may occur if there are disturbing objects, such as a narrow nozzle with rough walls, close to the probe. By increasing the Hold Off distance, the measuring range is reduced.
11. Click the **Apply** button to store the configuration.

See the *Rosemount 5300 Reference Manual (Document No. 00809-0100-4530)* for more information on *Hold Off Distance* and other configuration parameters.

12. Select the *Geometry* tab.



13. Enter the **Tank Reference Height (R)**. The Tank Reference height is defined as the distance from the Upper Reference Point to the Zero Reference Point
14. Enter the **Reference Distance (G)**. Reference Distance is the distance between the Upper Reference Point and the flange.
15. Enter the **Calibration Distance**. Use this variable to adjust the Tank Reference Height (R) so that measured product levels match the hand dipped level values. Normally a minor adjustment is necessary when the device is installed. For example, a minor deviation between the actual tank height and the value stored in the devcie database may occur if tank dimensions according to drawings are not quite up to date with actual dimensions.
16. Choose the appropriate **Mounting Type**; *Pipe Chamber*, *Direct Bracket*, or *Nozzle*. Choose *Unknown* if none of these is appropriate. Depending on the chosen mounting type you may also need to specify other parameters such as Inner Diameter and Nozzle Height.
17. Select the **Show level below probe end as zero** check box if you want the 5300 to present negative product levels as zero.
18. Click the **Apply** button to store the configuration, or click the **OK** button to store the configuration and close the window.

See the *Rosemount 5300 Reference Manual (Document No.00809-0100-4530)* for more information on various tank geometry parameters.

5.10.2 Installing a 5300 Using the Installation Wizard

The installation wizard in TankMaster WinSetup is a tool that may be used to install and configure a Rosemount 5300 Guided Wave Radar and other devices.

However, in most cases the following procedure is recommended when installing a new Rosemount 5300:

1. Configure the Rosemount 2160 FCU **Slave Database** by including the new 5300. Ensure that the correct Modbus address is configured (see “Installing a Rosemount 2160 FCU” on page 5-25 for more information).
2. Configure the Rosemount 2410 **Tank Database** in the *2410 Tank Hub Properties/Tank Database* window, (see “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information).
3. Install the 5300 in TankMaster via the *2410 Tank Hub Properties/Device Tags* window.
4. Configure the 5300 (see “Configuration via 5300 Properties” on page 5-91).

See also “Adding a Tank to a Raptor System” on page 5-114 for further information on adding tanks and devices to a Raptor system.

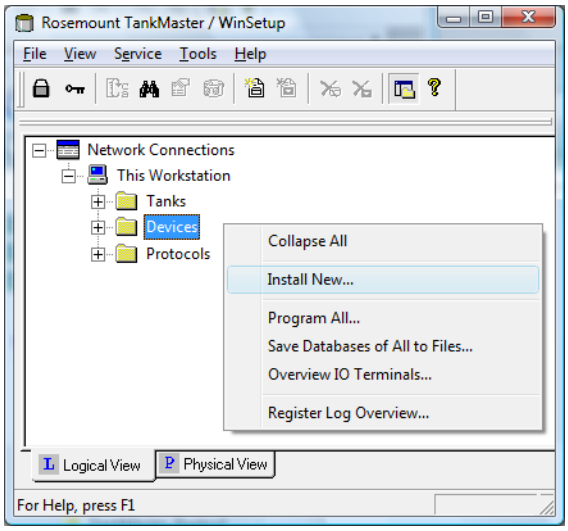
In case the recommended installation procedure can not be used, the installation wizard offers an alternative method to install a new Rosemount 5300 Guided Wave Radar in TankMaster. In this case do the following:

1. Configure the Rosemount 2160 FCU **Slave Database** by including the new 5300 radar. Ensure that the right Modbus address is configured (see “Installing a Rosemount 2160 FCU” on page 5-25 for more information).
2. Configure the Rosemount 2410 **Tank Database** in the *2410 Tank Hub Properties/Tank Database* window, (see “Installing a Rosemount 2410 Tank Hub” on page 5-38 for more information).
3. Install and configure the Rosemount 5300 as described in “Using the installation wizard” on page 5-96.

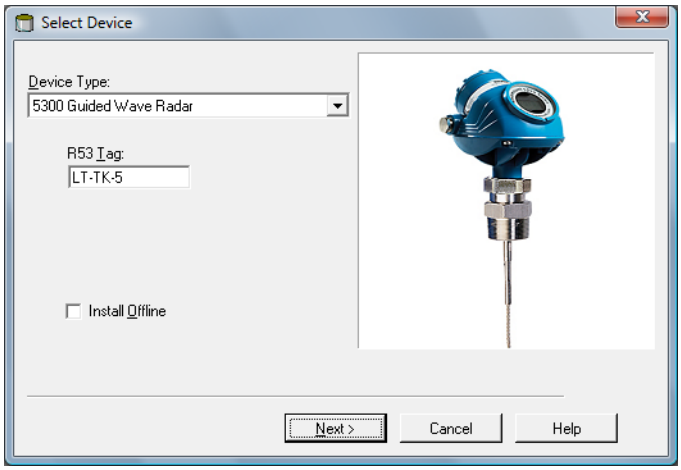
Using the installation wizard

To configure a Rosemount 5300 by using the WinSetup installation wizard perform the following steps:

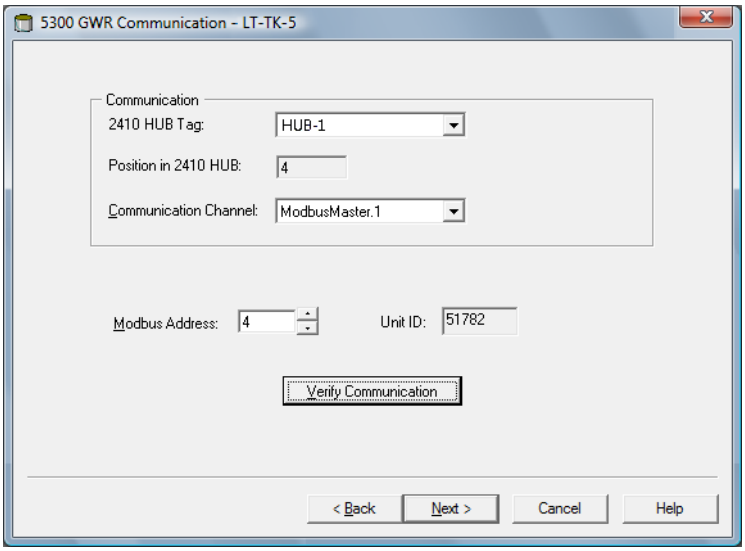
1. In the *Workspace* window select the **Devices** folder.



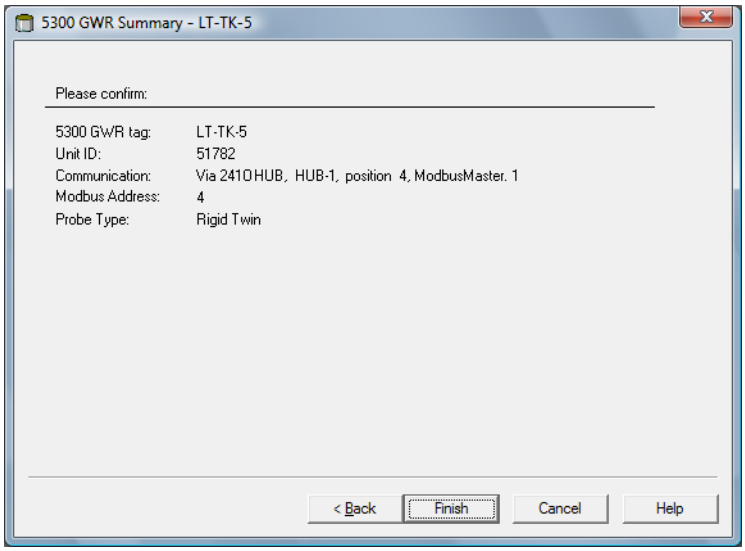
2. Click the right mouse button and select **Install New**, or from the **Service** menu choose **Devices/Install New**.
   The *Select Device* window appears:



3. Choose **Device Type** *5300 Guide Wave Radar* from the drop-down list.
4. Enter the level tag used for the 5300.
5. Click the **Next** button to open the *5300 GWR Communication* window.



6. In the 2410 Tag drop-down list choose the Rosemount 2410 Tank Hub that the 5300 radar is connected to.
7. Enter the **Modbus address** that is used for the 5300. Note that this address must be stored in the 2160 FCU Slave Database as well as in the 2410 Tank Database.
8. Click the **Verify Communication** button to verify that the TankMaster PC communicates with the 5300. The Unit ID will appear when contact is established.
9. Verify the tank position. The *Position in 2410 HUB* field shows the tank position that the 5300 is mapped to in the 2410 tank database. The tank position indicates which tank the 5300 is associated with. In case the 5300 radar is connected to a multiple tank version of the Rosemount 2410, the 5300 can be mapped to another tank position via the *2410 Tank Hub Properties/Tank Database* window if necessary (in the WinSetup workspace, click the right mouse button on the 2410 icon and choose the Properties option).
See “Tank Database Setup” on page 5-42 for more information on how to configure the 2410 Tank Database.
10. Click the **Next** button to proceed with the 5300 configuration.
11. For configuration of the *5300 GWR Probe* window refer to the appropriate parts in “Configuration via 5300 Properties” on page 5-91.
12. For configuration of the *5300 GWR Environment* window refer to the appropriate parts in “Advanced Configuration” on page 5-99.



13. In the *5300 GWR Summary* window click the **Finish** button to finish the installation wizard. If the configuration needs to be changed click the **Back** button until the desired window appears.

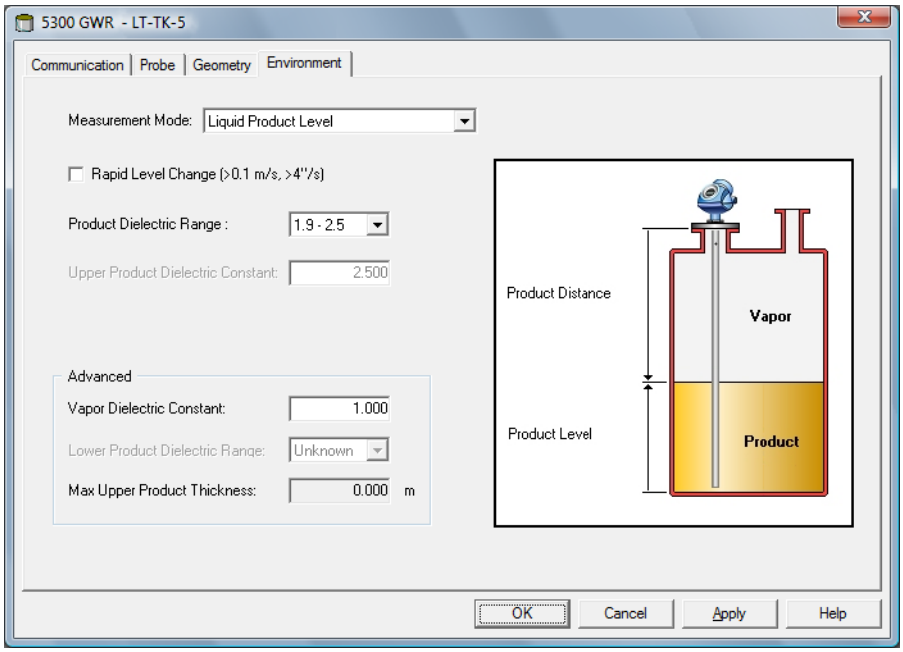
Further configuration options are available in the *5300 GWR* window, see “Advanced Configuration” on page 5-99.

5.10.3 Advanced Configuration

In addition to the basic configuration there are advanced configuration options available for the Rosemount 5300 Guided Wave Radar. Environment conditions such as rapid level changes and dielectric constants of products as well as vapor dielectric constant can be configured.

The *5300 GWR/Environment* window can be used to optimize the 5300 Guided Wave Radar for special tank conditions as illustrated below. To configure Environment parameters for the Rosemount 5300:

1. In the *Workspace* window, select the Rosemount 5300 icon.
2. Click the right mouse button and choose the **Properties** option. The *5300 GWR* window appears.
3. Select the *Environment* tab.



Measurement Mode

The 5300 is pre-configured according to the specified model and normally the measurement mode does not need to be changed.

Rapid Level Change

Select the **Rapid Level Change** check box if the surface is moving quickly up or down at rates over 0.1 m/s (4 inch/s).

Dielectric Constant/Dielectric Range

The Product Dielectric Range is used for setting the appropriate signal amplitude thresholds in order to filter out noise from the measurement signal.

In interface level measurements, dielectric constants can be configured for both the upper and the lower products. For the Product Dielectric Range choose option *Unknown* if the correct value range is not known or if the contents of the tank is changing on a regular basis.

For Measurement Mode *Liquid Product Level* enter the **Product Dielectric Range**. In some applications there is heavy vapor above the product surface having a significant influence on the level measurement. This may for example be the case of saturated water vapor under high pressure. In such cases the **Vapor Dielectric Constant** can be changed to compensate for this effect. Normally this value does not have to be changed since the effect on measurement performance is very small for most vapors. The default value is equal to 1 which corresponds to the dielectric constant of vacuum.

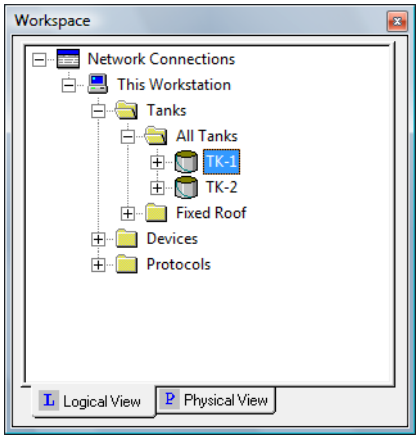
For Measurement Mode *Product Level and Interface Level* enter the **Upper Product Dielectric Constant**. If the dielectric constant of the lower product is significantly smaller than the dielectric constant of water you may need to adjust the **Lower Product Dielectric Range** as well.

See the *Rosemount 5300 Reference Manual (Document No. 00809-0100-4530)* for more information on tank environment settings.

5.11 INSTALLING A TANK

5.11.1 Overview

Basically the purpose of the tank installation procedure is to associate various devices to the right tanks. It also includes mapping variables such as Free Water Level and Vapor Pressure to specific instrument outputs.



By using the Tank Installation wizard, installing a new tank is a simple and straightforward procedure.

NOTE!
Make sure that measurement units are specified before installing a new tank. See also “Measurement Units” on page 5-16.

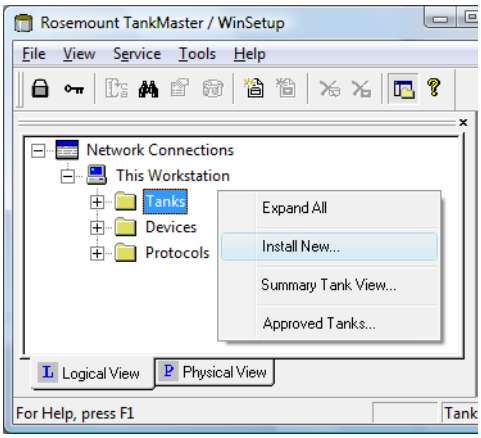
The specified measurement units only affect installation of new tanks. Changing measurement units has no effect on tanks which are already installed in WinSetup. This means that if you want to change measurement units for a previously installed tank, it has to be uninstalled first, and then installed again after changing the measurement units in the *Server Preferences/Units* window. See also *“Measurement Units” on page 5-16*.

A tank installation includes the following steps:

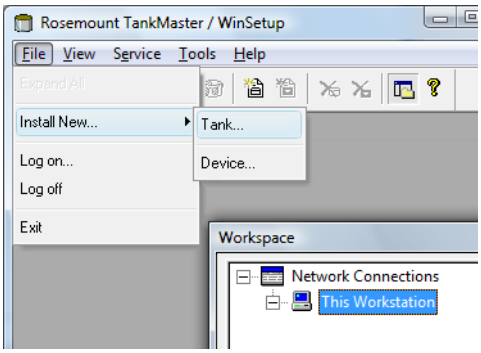
1. Specify tank type: Fixed Roof, Floating Roof, Sphere, Horizontal etc.
2. Select which devices to associate with the tank.
3. Configure the tank:
   Specify source signals for Free Water Level (FWL), Vapor Temperature, Vapor Pressure and Liquid Pressure to be used for inventory calculations, see “Advanced Parameter Source Configuration” on page 5-74.
4. Specify automatically measured or manual values as input for the different tank variables.

5.11.2 Starting the Tank Installation Wizard

To start the tank installation wizard do the following:



1. In the *Logical View* select the **Tanks** folder.
2. Click the right mouse button and choose **Install New** from the popup menu, or from the **File** menu choose **Install New>Tank**.



As an alternative you can use the following method:

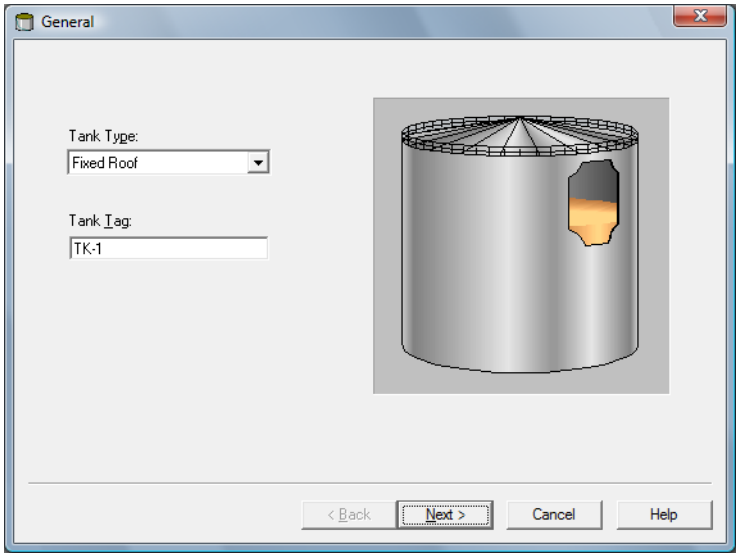
1. In the *Logical View* or the *Physical View* select the server where the system is installed.
2. From the **File** menu choose **Install New>Tank**.

See also *"Installing a New Tank" on page 5-103*.

5.11.3 Installing a New Tank

To install and configure a tank by using the WinSetup installation wizard do the following:

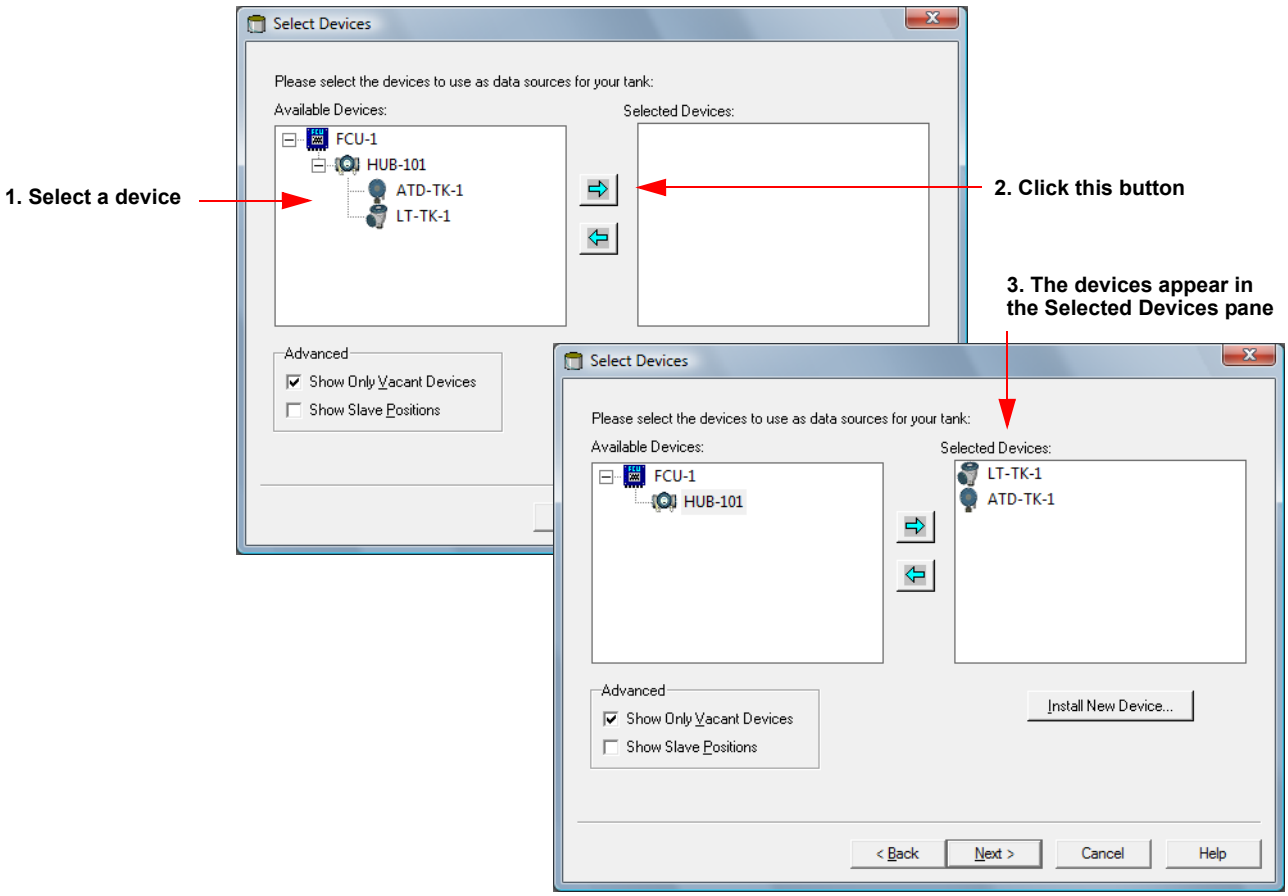
1. Start the TankMaster WinSetup program.
2. Start the tank installation wizard (see *"Starting the Tank Installation Wizard" on page 5-102* for more information).



3. Choose the appropriate tank type. For a Rosemount Raptor system the following options are available:
   - Fixed Roof
   - Floating Roof
   - Sphere
   - Horizontal
   - LPG Sphere
   - LPG Horizontal

4. Enter a name in the **Tank Tag** input field. A prefix appears automatically if you have defined one in the *Tag Prefixes* window, see *"Setting the Name Tag Prefixes" on page 5-20*. The same tank name should be used as specified in the 2410 Tank Hub's tank database, see "Installing a Rosemount 2410 Tank Hub" on page 5-38.
5. Click the **Next** button to proceed with the tank installation.

6. Assign devices to the current tank.



Choose a device from the list in the **Available Devices** pane and click the arrow button to move the device to the **Selected Devices** pane.

NOTE!
It is recommended that devices are installed prior to installing tanks. In a Raptor system field devices should be installed as described in “Installation Procedure” on page 5-2.

Show 2160 FCU Slave Positions (Advanced)

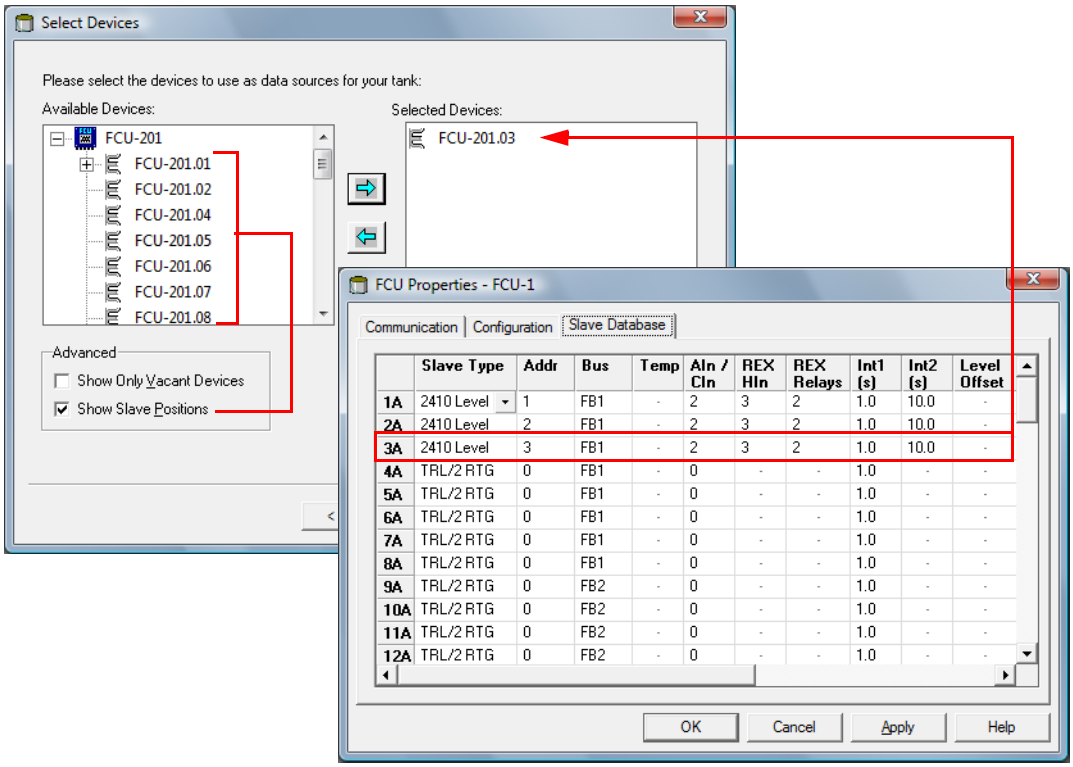
The “Show Slave Positions” check box should only be used for advanced tank configuration of devices which are not supported by the Raptor system.

A Rosemount Raptor device which is connected to the Tankbus and configured in the 2160 FCU Slave Database, will appear in the *Available Devices* pane at the left-hand side of the *Select Devices* window.

In case a device which can not be identified by the Raptor system is connected to the Tankbus, you will have to select the “Show Slave Positions” check box in order to map this device to a tank.

To associate an “unknown” device to a tank do the following:

a. In the *Select Devices* window, check the *Show FCU Slave Positions* check box to display the positions of the 2160 FCU Slave Database.



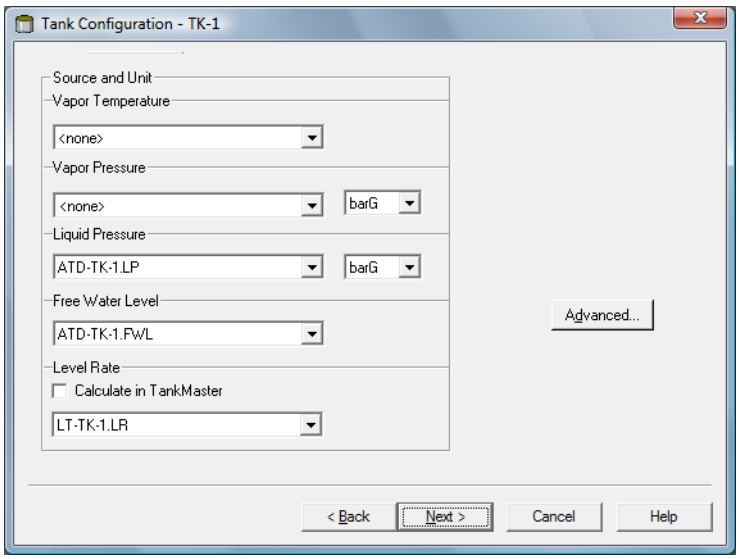
b. In the *Select Devices* window choose the Slave Database position that corresponds to the tank where the device is installed.
In the example above the devices are mapped to position 3 which is identified as FCU-201.03 in the FCU Slave Database.

c. Move the selected item to the **Selected Devices** pane by clicking the ⇨ button.

7. Click the **Next** button to proceed with the tank installation.

8. Configure the tank.

The *Tank Configuration* window lets you enable tank measurement variables such as **Vapor Temperature**, **Vapor Pressure**, **Liquid Pressure**, and **Free Water Level** (FWL) to be used for calculations of **Observed Density** and other inventory parameters. See the *TankMaster WinOpi Reference Manual* for more information on inventory parameters.



The *Calculate in TankMaster* check box may be used for devices without internal calculation of **Level Rate**. By selecting this check box the Level Rate is calculated by the TankMaster program.

Liquid Pressure and Vapor Pressure are not automatically mapped to measurement instruments. These measurement variables have to be mapped to an instrument in the *22XX ATD/Advanced Parameter Source Configuration* window in order to make them available for configuration in the *Tank Configuration* window. See Figure 5-11 on page 5-107 for an example of how to map the Liquid Pressure variable to the output of a Rosemount 3051S pressure transmitter.

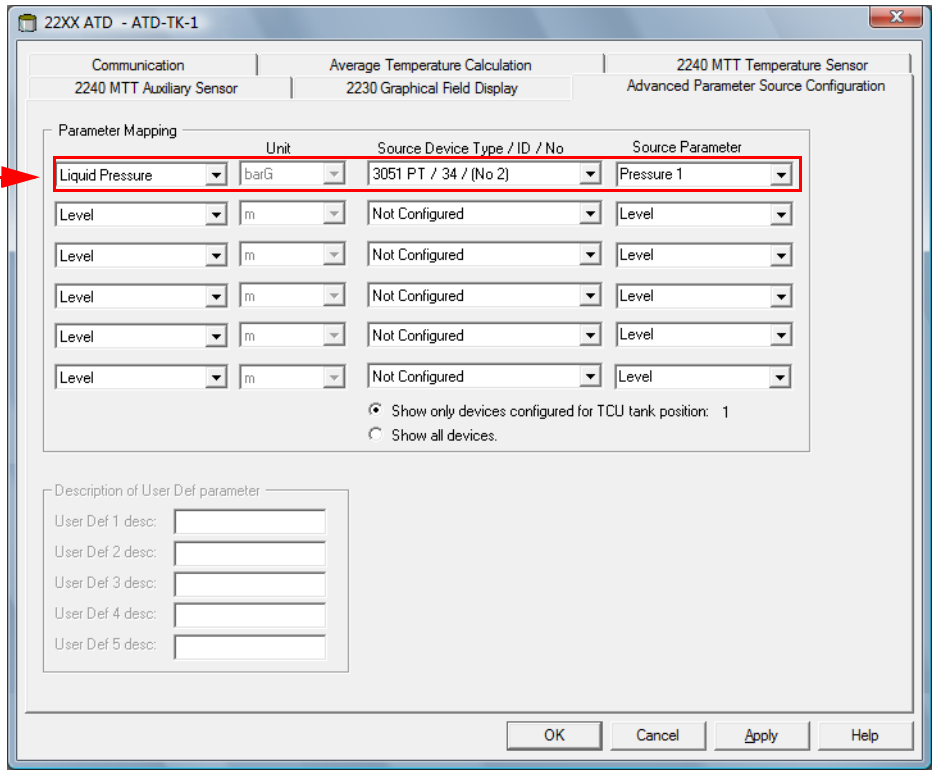
See also “Advanced Parameter Source Configuration” on page 5-74 for further information on mapping tank measurement variables to source devices.

To open the *22XX ATD/Advanced Parameter Source Configuration* window:

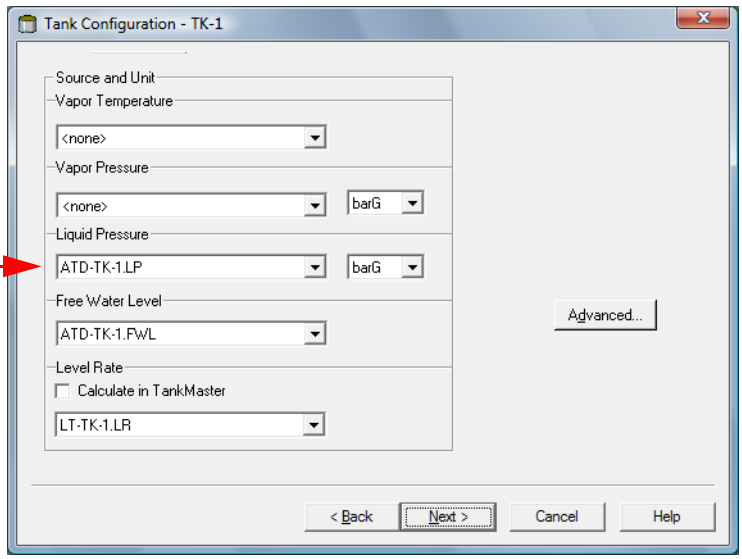
a. In the TankMaster WinSetup workspace, click the right mouse button on the ATD device icon and choose the Properties option.
b. Select the *Advanced Parameter Source Configuration* tab.
c. Map the appropriate tank measurement variable to the output of a transmitter that is available on the Tankbus. See an example in Figure 5-11 on page 5-107.

Figure 5-11. A measurement instrument which is mapped in the *22XX ATD/Advanced Parameter Source Configuration* window can be selected in the *Tank Configuration* window

22XX ATD/PARAMETER SOURCE WINDOW



TANK CONFIGURATION WINDOW



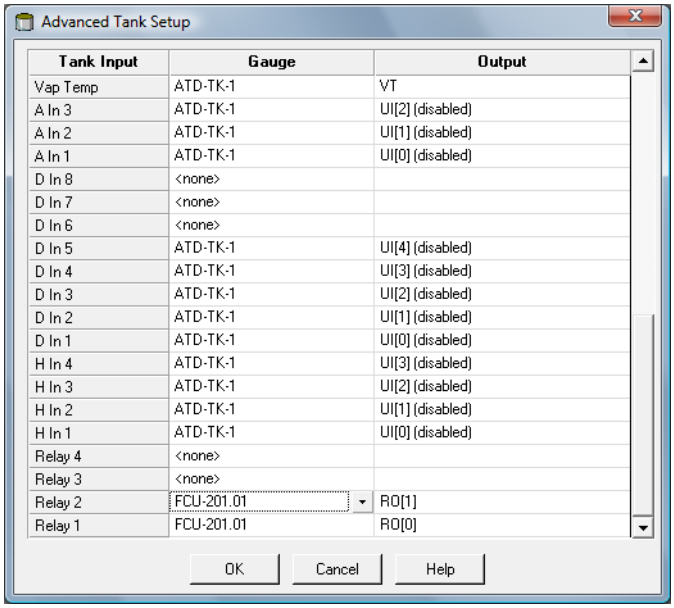
Advanced Configuration

The *Advanced Tank Setup* window allows you to change mapping of tank measurement variables to gauge output. This option can for example be used to map relay status presentation in the *TankMaster WinOpi* program to the relay outputs of a Rosemount 2410 Tank Hub.

NOTE!
Advanced configuration should only be used when there is no appropriate option available in the standard *Tank Configuration* window.

To change tank parameter mapping do the following:

a. Click the **Advanced** button in the *Tank Configuration* window.

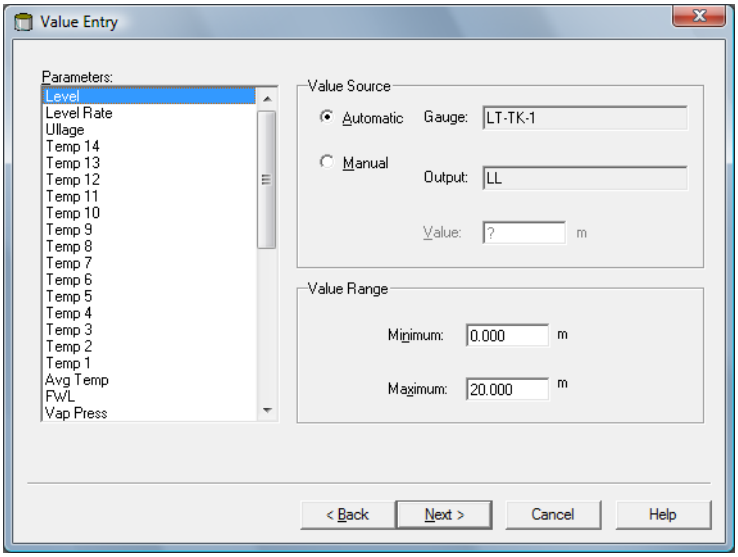


b. For each tank input variable you can change gauge output only, or you can change to another gauge as well. Simply put the mouse pointer in the Gauge or Output field of the desired Tank Input variable (Level, Level rate, etc.) and choose the appropriate option from the drop-down list.

c. Click the **OK** button to close the *Advanced Tank Setup* window.

9. In the *Tank Configuration* window, click the Next button to proceed to the next step of the tank installation procedure.

10. Specify parameter value range to be used in various windows for presentation of measurement data. Also choose whether to use measurement values (Automatic) from the available instruments or manual values.



The **Free Water Level**, **Liquid Pressure**, and **Vapor Pressure** parameters are set to Value Source=Manual by default. Therefore, the tank needs to be configured for automatic measurements when these type of instruments are used.

The *Value Entry* window allows you to disable automatic measurements for selected parameters in case you need to remove an instrument for service purposes.

To use manual values do the following:

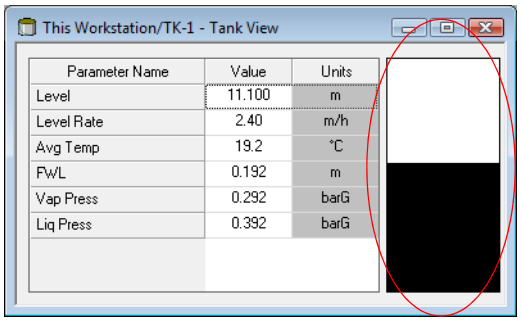
1. Chose a measurement variable in the left-hand list of the *Value Entry* window.
2. Set Value Source to **Manual**.
3. Type the desired value in the **Value** entry field.

Now the automatic measurement is disabled for the selected tank measurement variable. Manual values are marked yellow in order to distinguish from automatically measured values.

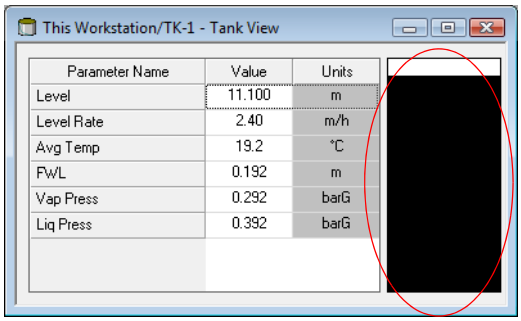
The **Value Range** parameters (Minimum and Maximum) lets you to scale bar graphs in the *Tank View* window and other windows (in Winsetup as well as WinOpi) where bar graphs are used to display product levels.

For example, the **Value Range** maximum value for Level is normally set equal to the Tank Reference Height (R), or the maximum level in the strapping table, to obtain correct scaling of the level bargraphs as illustrated below:

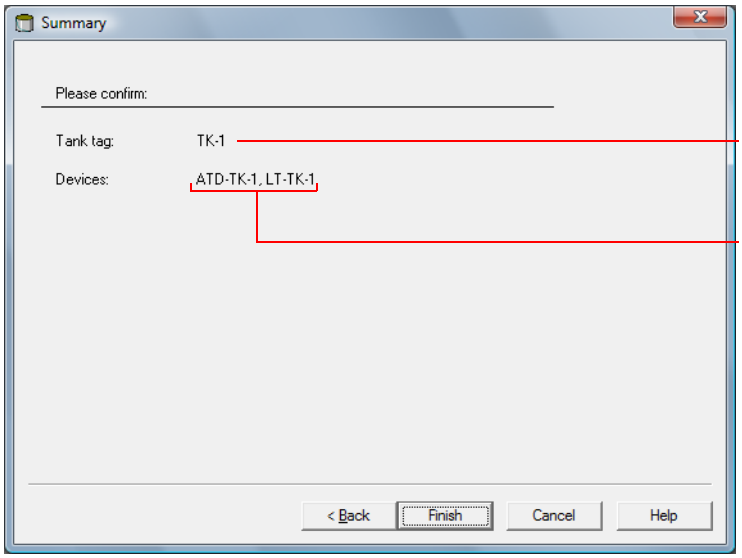
Value range:
Min=0
Max=20 m



Value range:
Min=0
Max=12 m

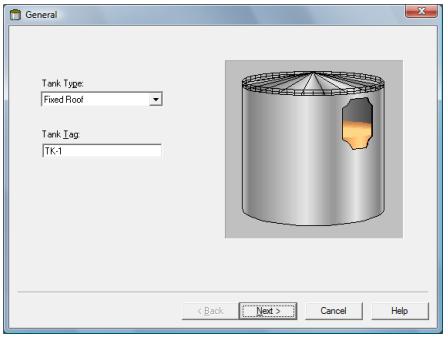


4. Summary.



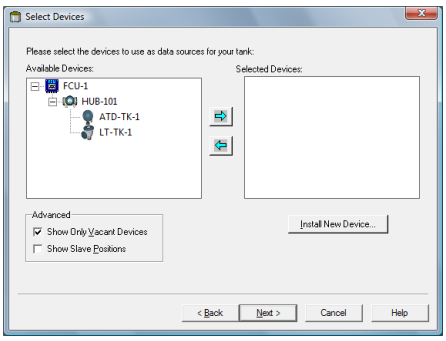
The *Summary* window presents information about the current tank installation. When you click the **Finish** button, the tank installation is completed and the tank appears in the *WinSetup Workspace*. You can choose not to finish the installation by clicking the **Cancel** button. Note that if a device was installed as part of the tank installation process, the device remains installed and appears in the *Workspace* although the tank installation was not completed.

5.11.4 Summary of Tank Installation and Configuration



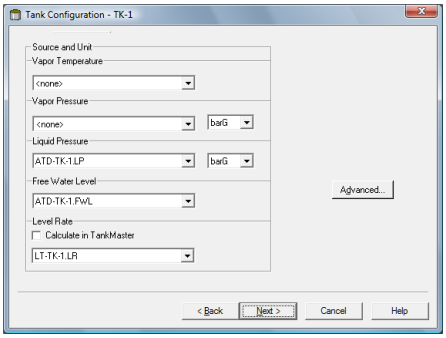
Tank Type

Choose the tank type option that corresponds to the actual tank.



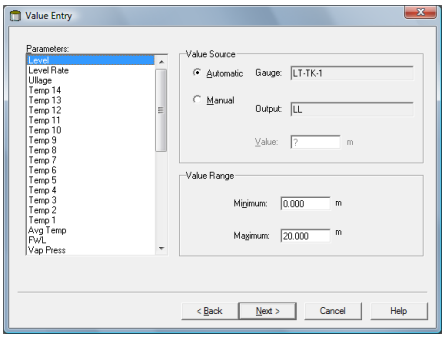
Select Devices

Associate devices with the tank.



Tank Configuration

Specify the source input for Vapor Temperature, Vapor Pressure, Liquid Pressure, and Free Water Level (FWL).



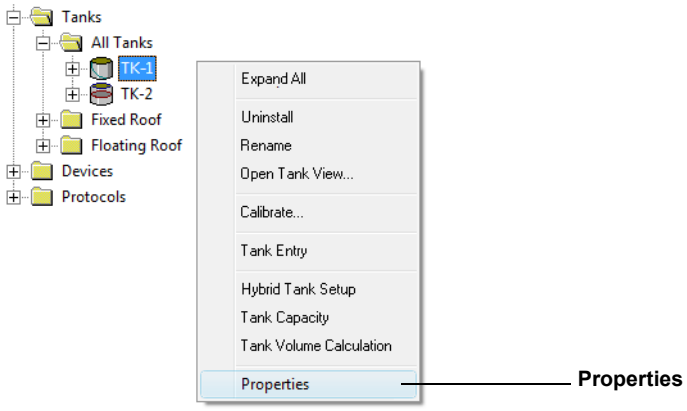
Value Entry

Configure for automatic measurements. If needed, set manual values by disconnecting the automatic measurement. Set the value range for scaling of measurement variables in bar graphs.

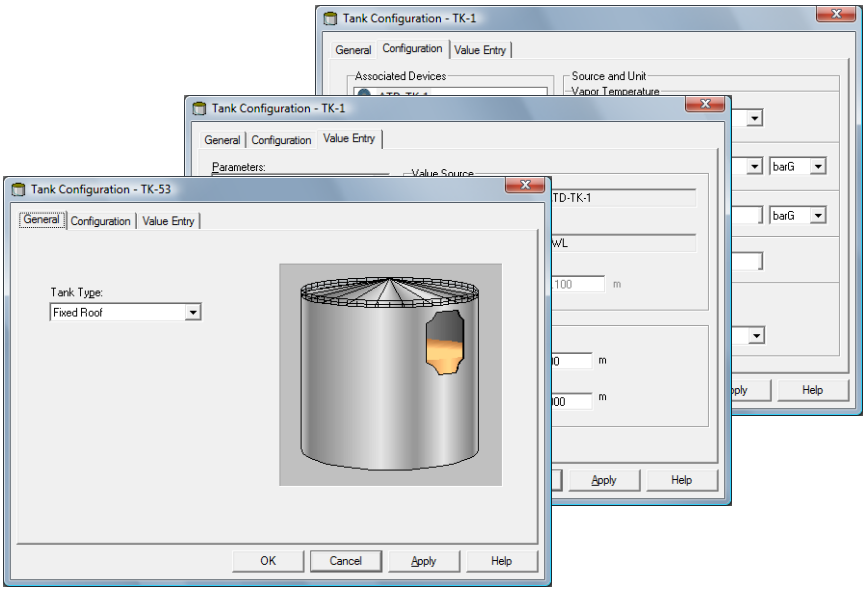
5.11.5 To Change Tank Configuration

When the tank is installed and configured the current settings can be modified at any time by opening the corresponding **Properties** dialog. To open the **Properties** dialog for a tank do the following:

1. In the *Workspace* window select the desired tank.



2. Click the right mouse button and choose the **Properties** option from the popup menu.
3. Change the current tank settings by selecting the appropriate tab in the *Properties* window. Click the **Apply** button to store the new configuration before advancing to the next tab.

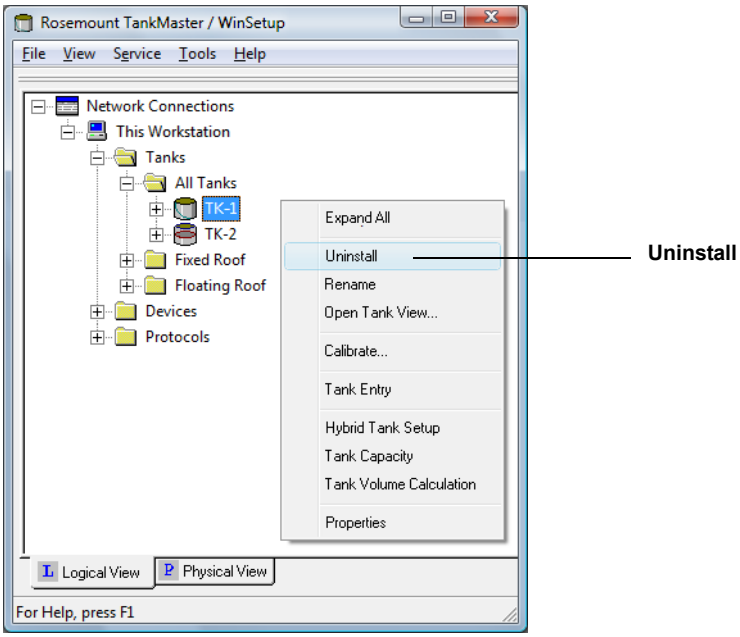


Basically the tabs correspond to the different steps in the installation wizard. See *"Installing a Tank" on page 5-101* for a description on how to configure a tank.

5.11.6 To Uninstall a Tank

To remove a tank from the *WinSetup* workspace do the following:

1. In the *Workspace* window select the tank you want to remove.



2. Click the right mouse button and choose the **Uninstall** option from the popup menu.

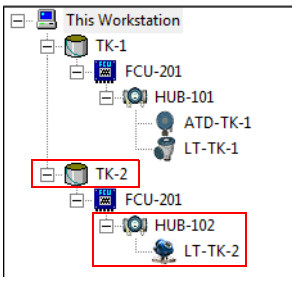
5.12 ADDING A TANK TO A RAPTOR SYSTEM

New tanks can easily be added to a Raptor system. The procedure will be slightly different depending on the specific system configuration. It can be summarized as follows:

Option 1. Installing a **new** Rosemount 2410 Tank Hub and a new tank.

1. Configure the communication settings of the 2160 Field Communication Unit (FCU).
2. Update the 2160 FCU Slave Database by adding the field devices to be associated with the new tank.
3. Install the new Rosemount 2410 Tank Hub and configure the Tank Database by mapping the field devices to the new tank.
4. Configure the new field devices added to the 2410 tank database (Rosemount 5900S, Rosemount 2240S, Rosemount 3051S etc.).
5. Configure the new tank.

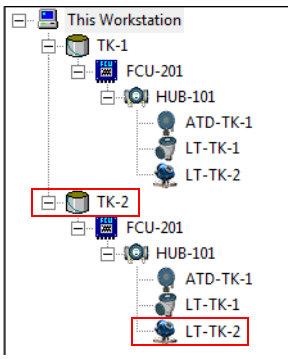
Figure 5-12. A new tank and 2410 Tank Hub are added to the workspace



Option 2. Adding a new tank to an **existing** Rosemount 2410 Tank Hub.

1. Update the 2160 FCU Slave Database by adding the field devices installed on the new tank.
2. Update the tank database of the existing Rosemount 2410 Tank Hub by mapping the new field devices to the new tank.
3. Configure the field devices added to the 2410 tank database.
4. Configure the new tank.

Figure 5-13. A new tank is added to an existing 2410 tank hub

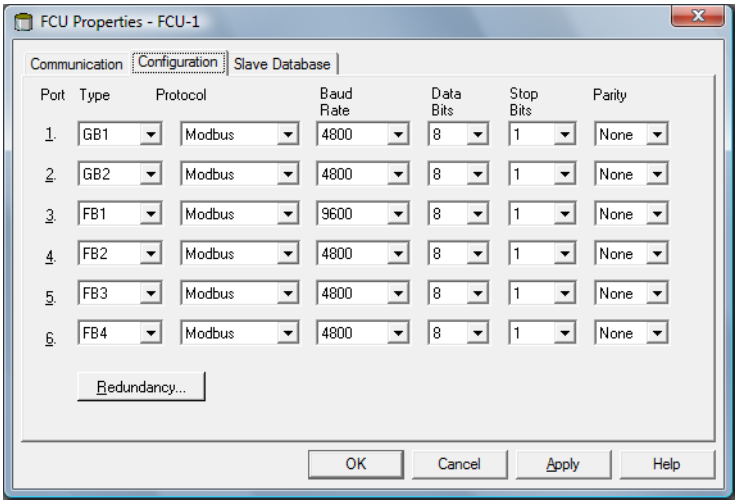


Detailed descriptions of the two procedures outlined above are provided in sections “Adding a New Tank and a New 2410 Tank Hub” on page 5-115 and “Adding a New Tank to an Existing 2410 Tank Hub” on page 5-117.

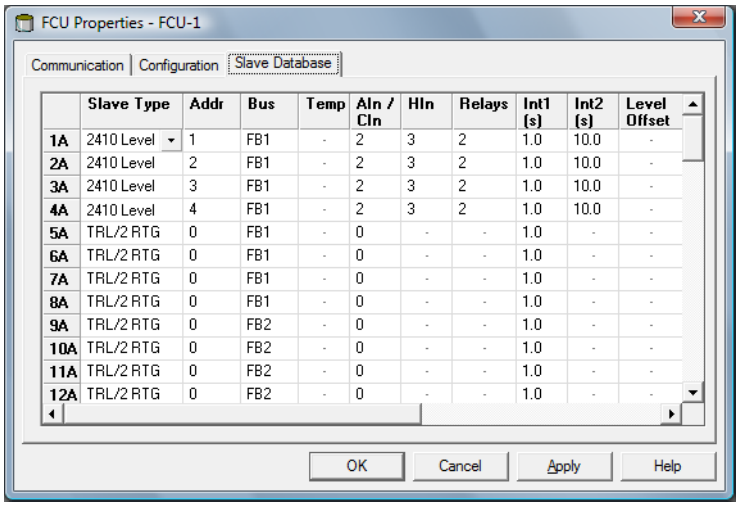
5.12.1 Adding a New Tank and a New 2410 Tank Hub

To add a new tank and new field devices to a Raptor system do the following:

1. Start the TankMaster WinSetup program.
2. In the WinSetup workspace, right-click the icon of the 2160 Field Communication Unit (FCU) to open the *2160 FCU Properties* window.
3. Select the *Configuration* tab:



4. In case the 2410 is connected to a field bus port on the FCU which has not been used prior to adding the new 2410 Tank Hub, ensure that the *FCU Properties/Configuration* window is properly configured for the 2410 Primary Bus.
   For example, you may have to change the Baud Rate setting depending on the type of communication bus that is used; RS -485 or TRL2.
   See “Installing a Rosemount 2160 FCU” on page 5-25 for further instructions and information.
5. Click the Apply button to save the configuration.
6. Select the *Slave Database* tab.



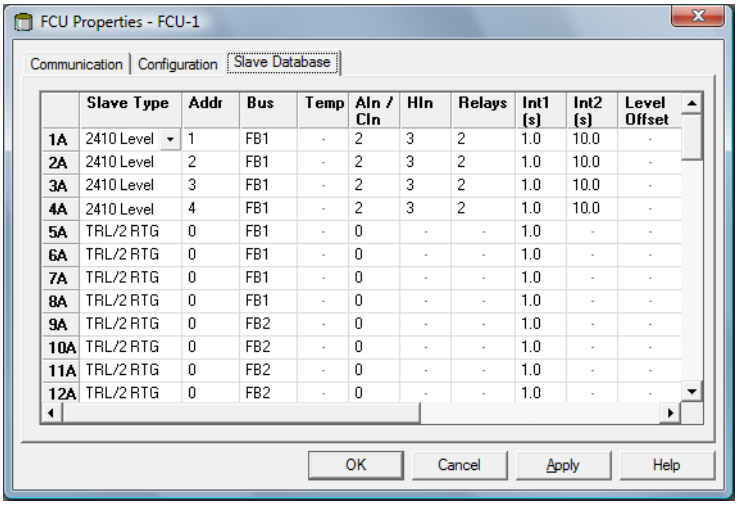
7. Configure the Slave Database with Modbus addresses for the new level gauge and ATD devices, see “Installing a Rosemount 2160 FCU” on page 5-25 for more information.
8. Install and configure a Rosemount 2410 Tank Hub and the field devices connected to the Tankbus as described in “Installing a Rosemount 2410 Tank Hub” on page 5-38.
9. Install a tank and associate the new 2410 to the tank as described in “Installing a Tank” on page 5-101.

Now the new tank and field devices are installed and configured and will appear in the TankMaster workspace.

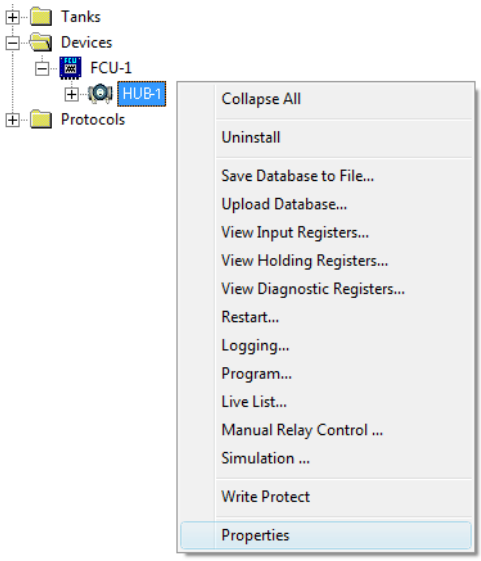
5.12.2 Adding a New Tank to an Existing 2410 Tank Hub

In case the new devices are connected to an existing 2410 Tank Hub, you will have to update the 2410 tank database, and install and configure the new devices in TankMaster WinSetup.

1. Start the TankMaster WinSetup program.
2. Open the *2160 FCU Properties* window.
3. Select the *Slave Database* tab.

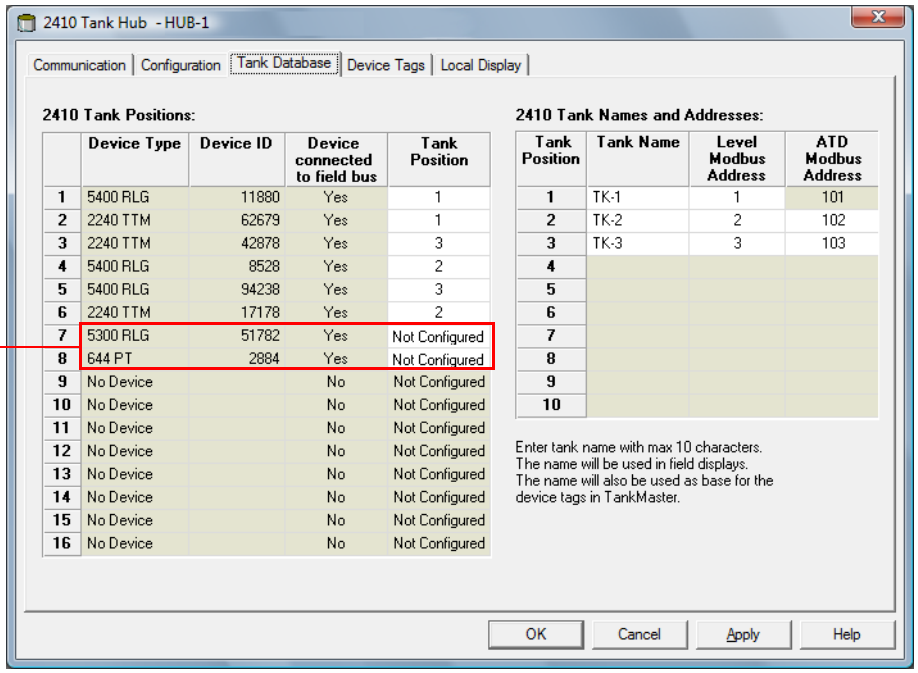


4. Configure the Slave Database with Modbus addresses of the new level gauge and ATD devices, see “Installing a Rosemount 2160 FCU” on page 5-25 for more information.
5. In the WinSetup *Workspace,* select the 2410 Tank Hub icon:

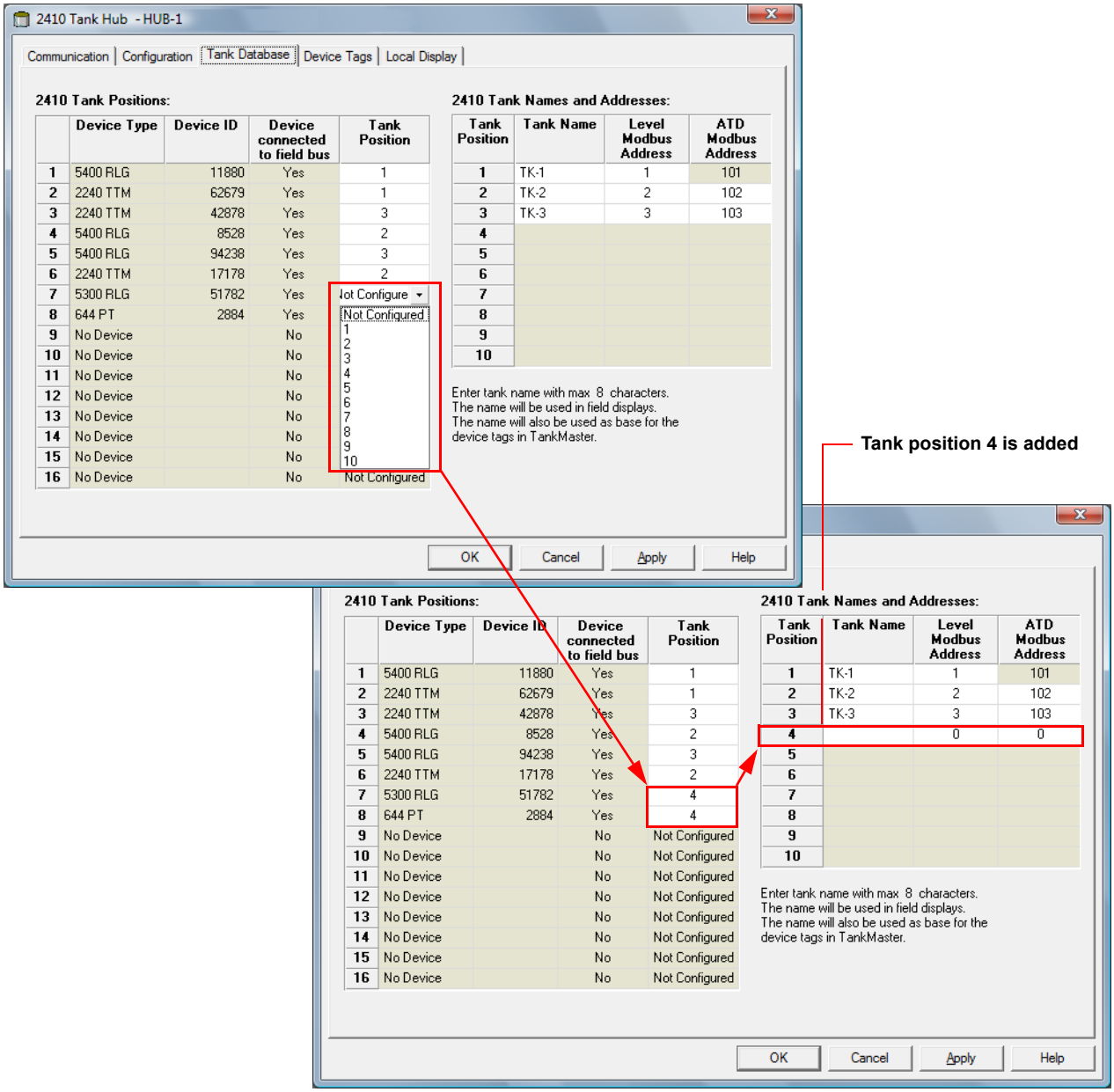


6. Click the right mouse button and choose the **Properties** option, or from the **Service** menu choose **Devices>Properties**.

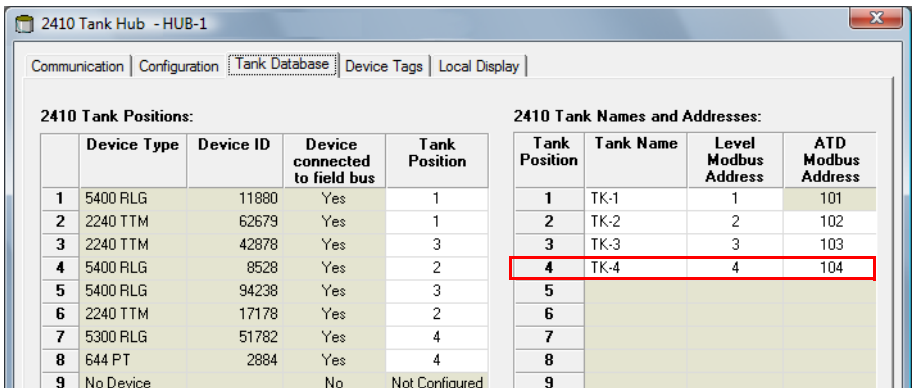
7. Select the *Tank Database* tab:



8. Verify that the new devices connected to the Tankbus appear in the **Device Type** column. Devices that appear in the list are communicating properly on the Tankbus. Devices supported by the Raptor system will automatically be identified by the 2410.
9. Ensure that the devices to be associated with the new tank are marked “Not Configured” in the *Tank Position* column.
10. Map the new devices to a tank in the **Tank Position** column by selecting the appropriate number in the drop-down list.



11. Verify that a new tank position appears in the right-hand pane of the *Tank Database* window. In the example above, the new devices are mapped to tank position 4, and a tank position was added to the list of tanks in order to allow configuration of tank name and Modbus addresses for the new devices.

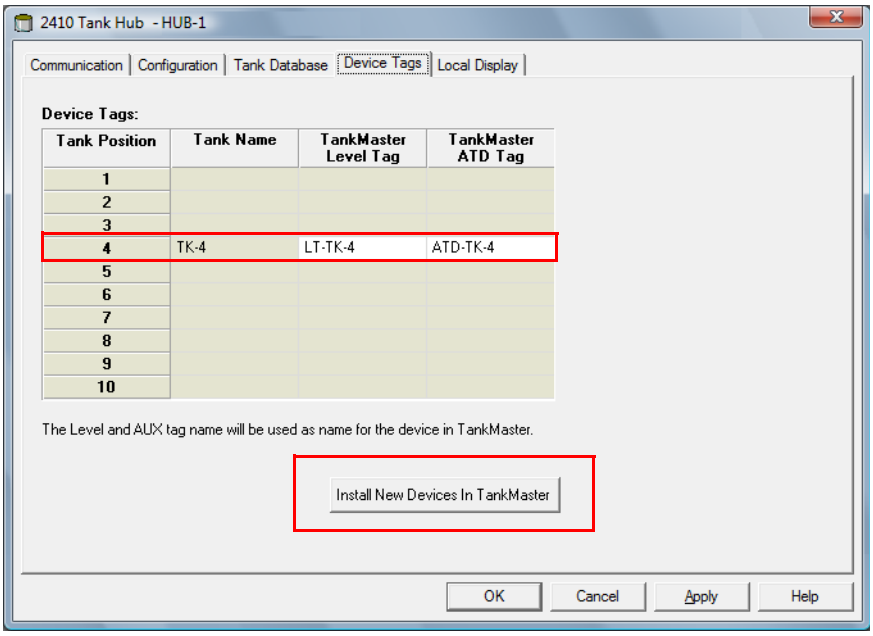


12. Type a name in the **Tank Name** field. This tank name should also be used at a later stage when installing the tank to be associated with the current 2410 Tank Hub, see “Installing a Tank” on page 5-101.
13. The **Level Modbus Address** field is enabled for the new level gauge. Specify a Modbus address of your own choice. Note that it must be the same Modbus address as configured in the 2160 FCU Slave Database for this level gauge.
14. In case a non-level Auxiliary Tank Device (ATD) such as a Rosemount 2240S Multi-input Temperature Transmitter is installed, the **ATD Modbus Address** field is enabled as well.

    Specify a Modbus address of your own choice. Note that it must be the same Modbus address as configured in the 2160 FCU Slave Database. For tank position 1, the ATD Modbus address is automatically configured as the Modbus address of the Rosemount 2410 Tank Hub itself. All the non-level devices on a tank are represented by a single ATD device in the Rosemount Raptor system.

    See *“Installing a Rosemount 2160 FCU” on page 5-25* and *“Examples of 2160 FCU Slave Database Configuration” on page 5-32* for further information on how to configure the 2160 FCU slave database and the tank database in the 2410 Tank Hub.

15. Click the **Apply** button to store the tank database configuration.
16. Select the *Device Tags* tab:



17. Verify that the **TankMaster Level Tag** is correct or enter a new one.
18. Verify that the **TankMaster ATD Tag** is correct or enter a new one. In case there are no ATD device associated with the tank, the ATD tag field will be disabled.
19. Click the **Install New Devices in TankMaster** button to automatically install the devices in the *TankMaster Workspace.* This is the recommended way of installing field devices in TankMaster, but you may install the devices at a later stage by using the device installation wizard, see “Using the Device Installation Wizard” on page 5-5.
20. Click the **OK** button to store the configuration and close the 2410 Tank Hub configuration window.
21. The devices will now be available in the TankMaster workspace, and each device has to be configured via the *Properties* window, see for example “Installing a Rosemount 5900S Radar Level Gauge” on page 5-51 and “Installing Auxiliary Tank Devices” on page 5-65.
22. Proceed with installing the tank as described in “Installing a Tank” on page 5-101.

Now the new tank and field devices are installed and configured and will appear in the TankMaster workspace.

5.13 LEVEL GAUGE CALIBRATION

Normally a minor level gauge adjustment is needed in order to achieve good agreement between measured and actual product levels. For example, a deviation may result from minor errors in tank geometry parameters such as the tank height (R) or the position of the Gauge Reference Point (see the Rosemount 5900S Radar Level Gauge reference manual, Document No. 300520EN, for more information on tank geometry).

The Rosemount 5900S level gauge can be calibrated by using the Calibration Distance parameter. It can be manually adjusted in the *5900S Properties/Geometry* window, or you may use the **Calibrate** function to let WinSetup automatically calculate an optimized Calibration Distance based on measurement data and hand dipping at different product levels.

NOTE!
For a comprehensive description of how to calibrate a Rosemount 5900S Radar Level Gauge see the *Rosemount 5900S Reference Manual* (Document No. 300520EN).

5.13.1 Manual Adjustment

A Rosemount 5900S level gauge can be calibrated manually by adjusting the Calibration Distance parameter(1). By comparing a hand dipped level value with the product level measured by the level gauge, a Calibration Distance value can be calculated according to the formula:

New Calibration Distance=Old Calibration Distance+ΔL,

where ΔL=observed level (hand dip) - gauge level reading.

To change the Calibration Distance stored in the gauge database:

1. Select the level gauge icon in the WinSetup workspace.
2. Click the right mouse-button and choose the **Properties** option.
3. Select the **Geometry** tab.
4. Type the **Calibration Distance** value in the corresponding input field and click the **OK** button.

   See “Installing a Rosemount 5900S Radar Level Gauge” on page 5-51 and the *Rosemount 5900S Reference Manual (*Document No. 300520EN) for further information.

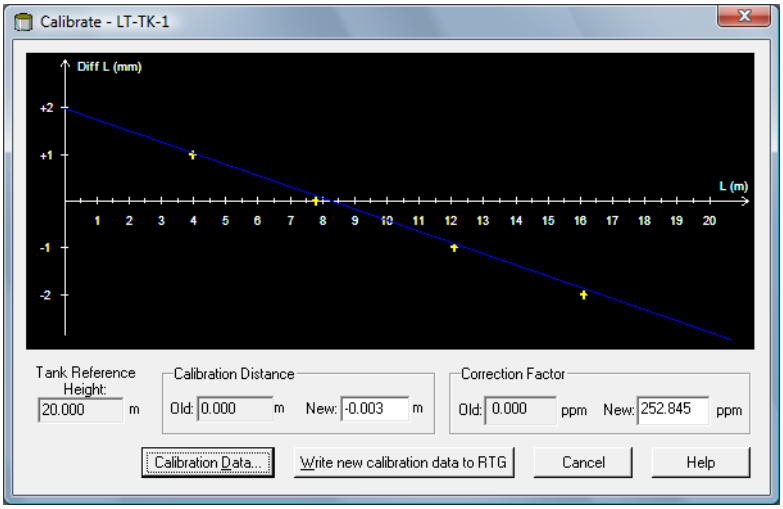
(1) For non-standard antennas the Tank Connection Length (TCL) may need to be adjusted as well.

5.13.2 Using the Calibrate Function

The **Calibrate** function is a tool which allows you to calculate the Correction Factor for still-pipe measurements and the Calibration Distance. It optimizes measurement performance from the top to the bottom of the tank by automatically minimizing the offset between actual product levels and level values measured by the gauge.

To calibrate a Rosemount 5900S Rada Level Gauge

1. Select the 5900S level gauge icon in the *Workspace* window, click the right mouse button and choose **Calibrate**, or choose **Calibrate** from the **Service/Devices** menu:



2. Click the **Calibration Data** button to open the *Calibration Data* window. Enter hand dipped level values and the corresponding levels measured by the gauge. Click the **Save Calibration Data in PC Database** button.

   The *Calibration* window displays a straight line fitted through measurement points representing the difference between hand dipped level values and values measured by the level gauge. For still-pipe antennas a sloping line is displayed, otherwise the line is horizontal.

3. Click the **Write new calibration data to RTG** button in order to save the current calibration data. By clicking the **Write new calibration data to RTG** button, a new Calibration Distance is calculated and the 5900S level values in the *Calibration Data* window are recalculated.

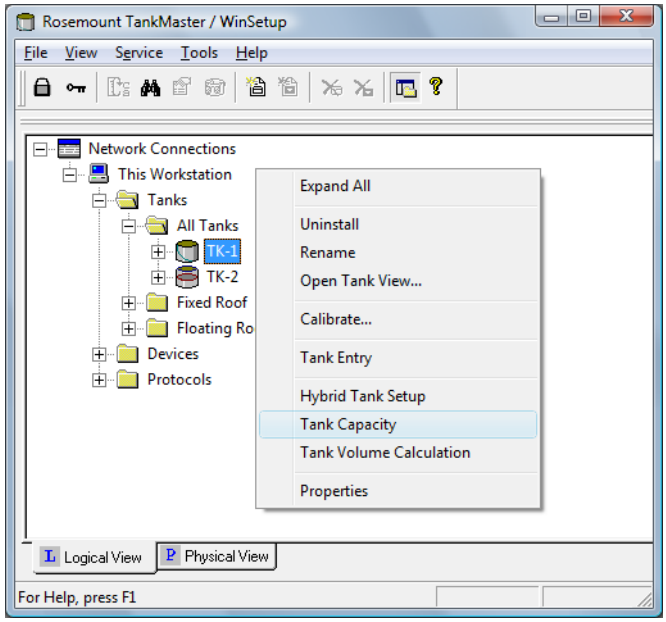
   See the *Rosemount 5900S Reference Manual (*Document No. 300520EN) for further information on using the Calibrate function for a Rosemount 5900S Radar Level Gauge.

5.14 TANK CAPACITY

The tank geometry can be defined in a strapping table; the **Tank Capacity Table** (TCT). The TCT is used to convert a product level to a volume. Different TCT types can be specified: Raw; International, and Northern.

See the *Rosemount TankMaster WinOpi Reference Manual* (Document No. 303028EN) for more information on how to set up a Tank Capacity Table.

To open the *Tank Capacity Setup* window for a certain tank, select the tank icon in the workspace window, click the right mouse button and choose the Tank Capacity option:

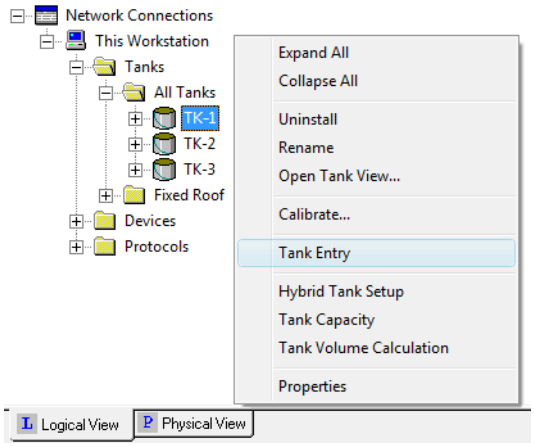


See the *Rosemount TankMaster WinOpi Reference Manual* (Document No. 303028EN) for more information on the *Tank Capacity Setup* window.

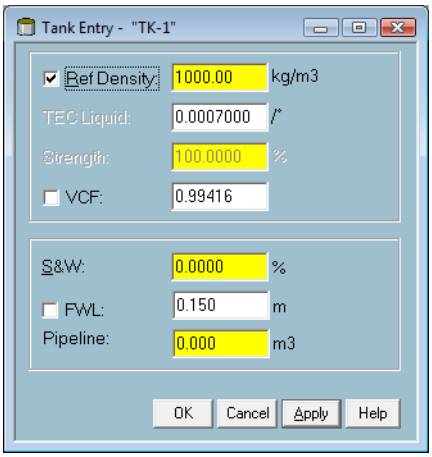
5.15 TANK ENTRY

The *Tank Entry* window is used for specifying a number of product parameters to be used for inventory calculations. TankMaster can use measured data, or data that is manually entered. To open the *Tank Entry* window:

1. In the WinSetup workspace select the tank to configure.



2. Click the right mouse button and choose the Tank Entry option:



3. To enter manual values select the check box and type the desired value in the input field. Manual values are marked with yellow as illustrated above.

See the *Rosemount WinOpi Reference Manual* (Document No. 303028EN) for further information on how to use the *Tank Entry* window.

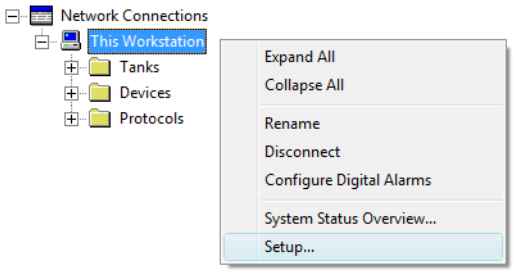
5.16 SETTING UP A HYBRID SYSTEM

This is a description of how to install a Rosemount Raptor on-line density measurement system to be used for mass calculations. Before starting the setup make sure the 2160 FCU Slave Database is configured accordingly, see *"Installing a Rosemount 2160 FCU" on page 5-25*.

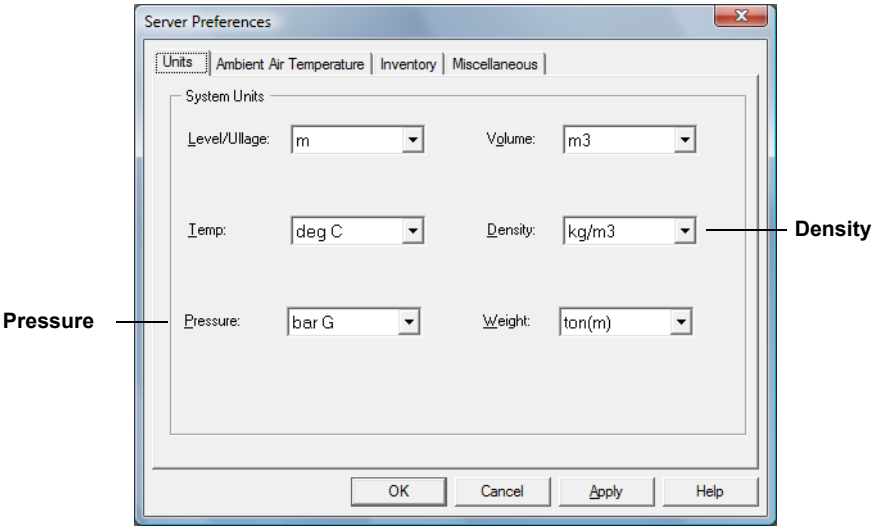
For the mass calculations to work properly, a tank strapping table (also refered to as a Tank Capacity Table) must be entered, see *the TankMaster WinOpi Reference Manual,* Document No. 303028EN for more information.

A Rosemount Raptor hybrid system typically includes two pressure sensors, P1 and P3, and a Rosemount 5900S Radar Level Gauge. To configure the system do the following:

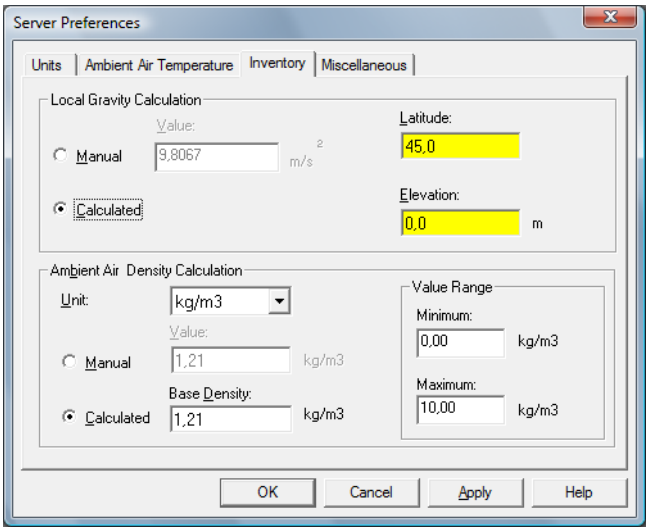
1. Start the TankMaster WinSetup program.
2. In the *Workspace* window select the tank server icon (*This Workstation* in the example below)*:*



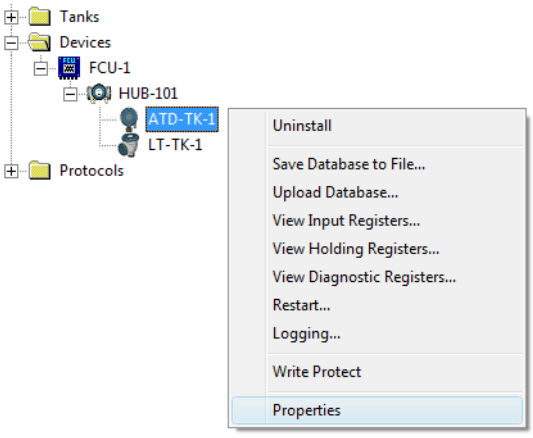
3. Click the right mouse button and select **Setup**, or choose menu option **Service>Servers>Setup** to open the *Server Preferences* window.
4. Select the *Units* tab.



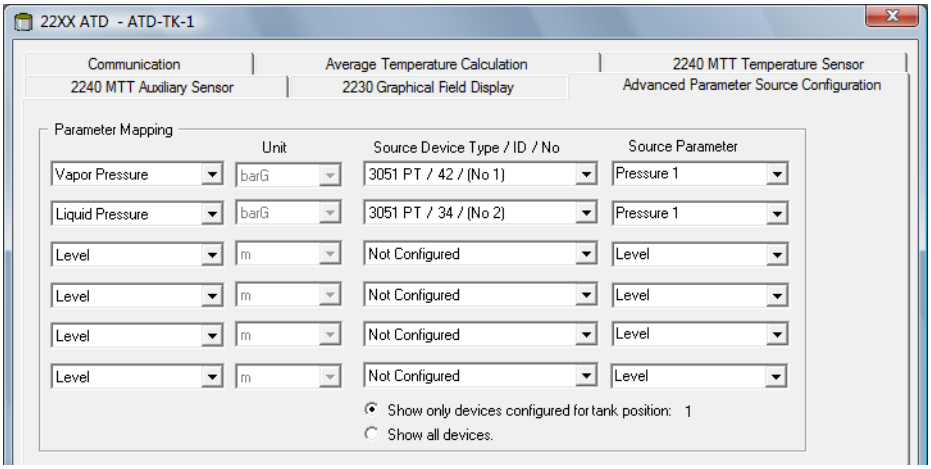
5. Choose the desired measurement units for **Density** and **Pressure**.
6. Click the **Apply** button to store the settings.
7. Select the *Inventory* tab.



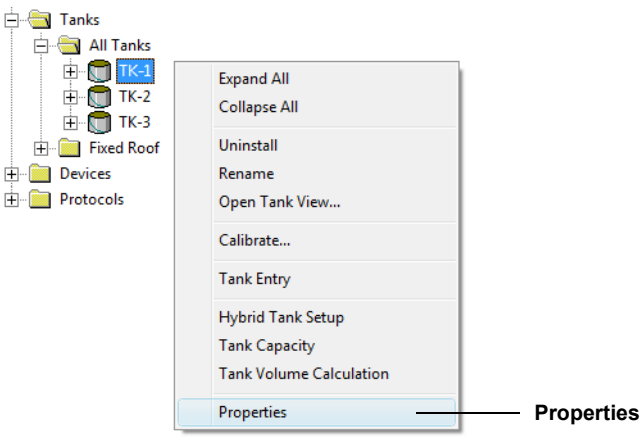
8. For Local Gravity choose calculation method **Manual** or **Calculated**. The Local Gravity is used as input for calculating the Observed Density.
   Manual: enter a local gravity value in the “Value” field.
   Calculated: enter the latitude and elevation of the site where the tank is located.
9. Click the **OK** button to store the configuration and close the window.
10. In the *Workspace* window select the ATD device icon:



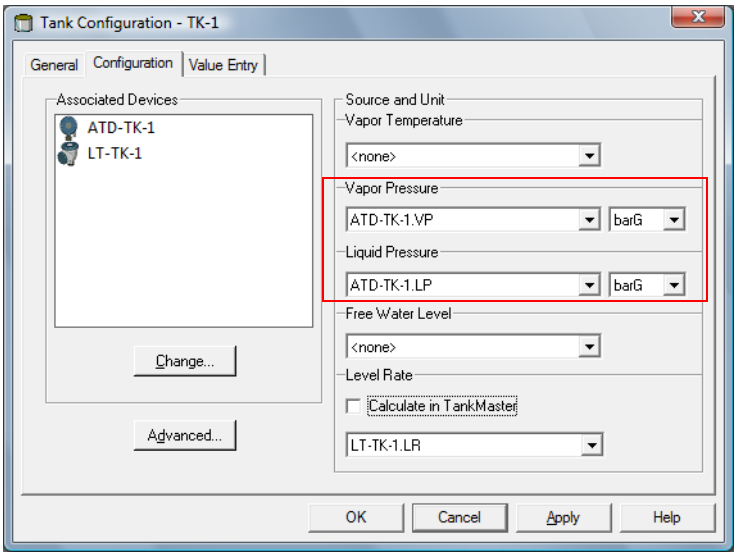
11. Click the right mouse button and select **Properties**, or from the **Service** menu choose **Devices>Properties** to open the *22XX ATD* window.
12. Select the *Advanced Parameter Source Configuration* tab.



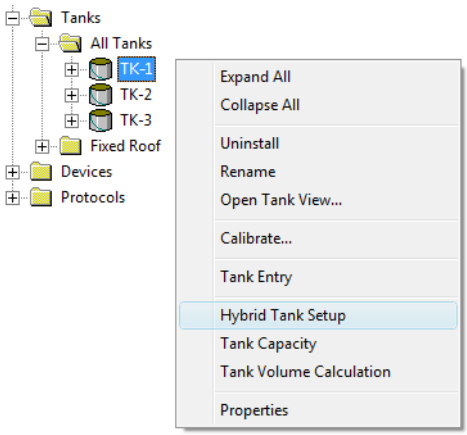
13. Verify that the parameters **Vapor Pressure** and **Liquid Pressure** are mapped to the correct pressure sensors (Source Device).
See “Advanced Parameter Source Configuration” on page 5-74 for further information on mapping system parameters to source devices.
14. Click the **OK** button to store the configuration and close the window.
15. Open the *Tank Configuration* window. In Winsetup select the desired tank icon in the workspace window:



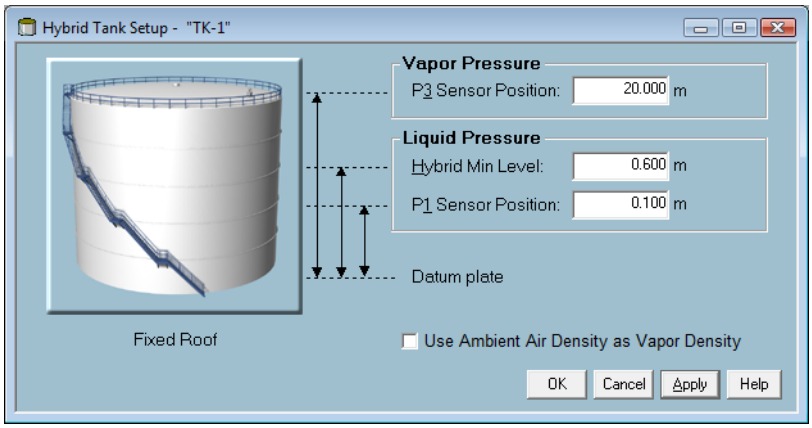
16. Click the right mouse button and choose **Properties**, or from the **Service** menu choose **Tanks>Properties** to open the *Tank Configuration* window.
17. Select the *Configuration* tab.



18. Choose source parameter and measurement unit for Vapor Pressure and Liquid Pressure.
19. Verify measurements by opening the *Tank View* window (**Service>Tanks>Open Tank View**).
20. Configure the Liquid Pressure and Vapor Pressure sensors. In the WinSetup workspace window select the tank icon:



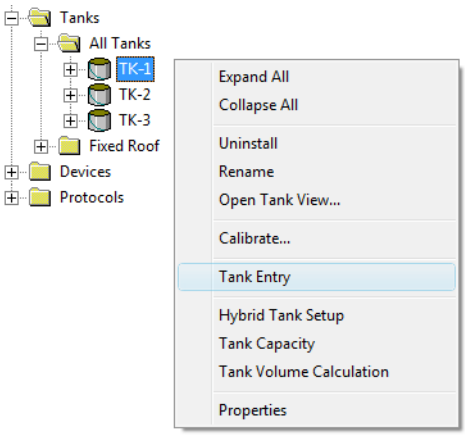
21. Click the right mouse button and choose **Hybrid Tank Setup**, or from the **Service** menu choose **Tanks>Hybrid Tank Setup**, to open the *Hybrid Tank Setup* window.



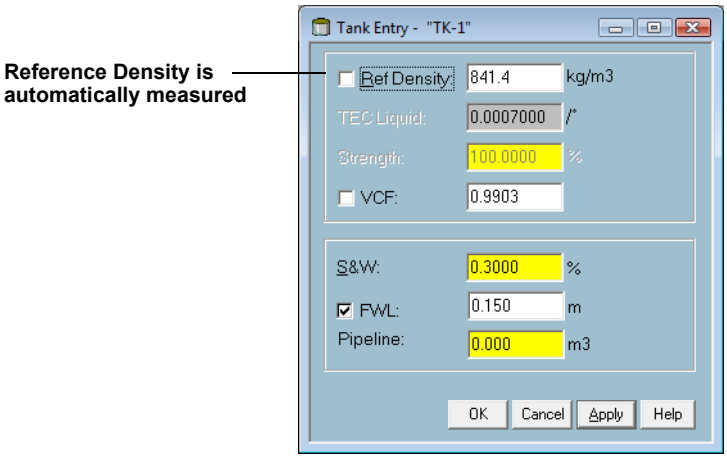
22. Enter the **P1 Sensor Position**, i.e. the center position of the Liquid Pressure sensor membrane.
23. Enter the **Hybrid Min Level**. This value specifies the lowest product level at which TankMaster calculates the **Observed Density**. Normally, the accuracy of pressure sensors is poor at low pressures, i.e. at product levels close to the sensor membrane. Therefore, you can enter a limit below which the density calculation is “frozen”. For example, if Hybrid Min Level is equal to 0.6 meter, TankMaster WinOpi will present the same density value for product levels below 0.6 meter.

NOTE!
Specify the actual minimum product level and not the distance between the pressure sensor and the product surface.

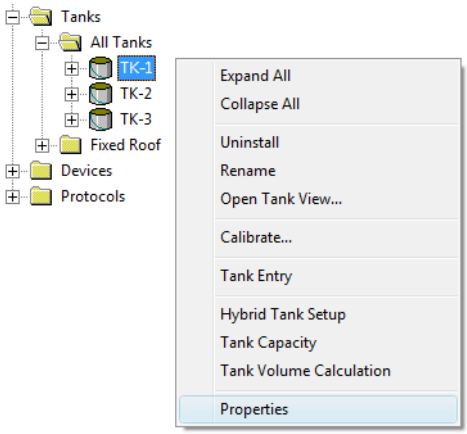
24. Enter the **P3 Sensor Position**, i.e. the position of the center of the Vapor Pressure sensor membrane.
25. Click the **Apply** button to save the Hybrid Tank Setup configuration, or the **OK** button to save and close the window.
26. In the WinSetup workspace window select the tank icon:



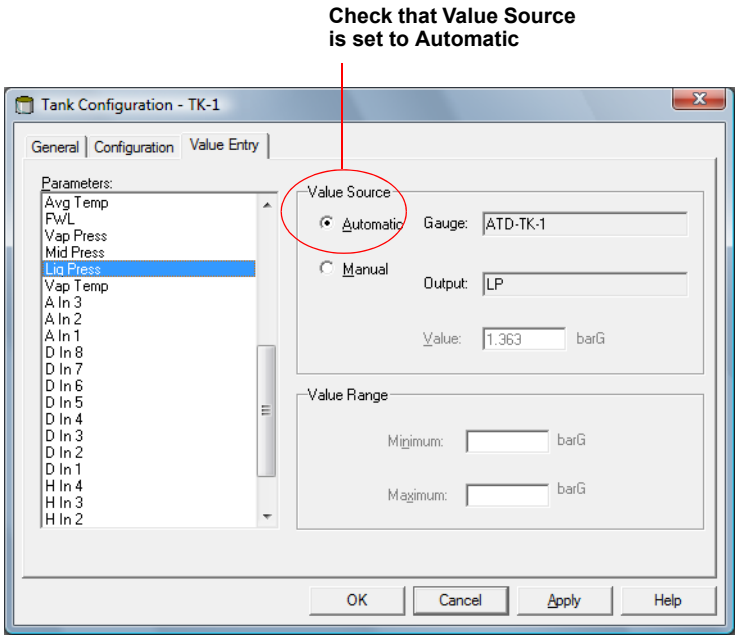
27. Click the right mouse button and choose **Tank Entry**, or from the **Service** menu choose **Tanks>Tank Entry** to open the *Tank Entry* window:



28. Make sure that the **Reference Density** is measured automatically, i.e. the check box is unmarked.
29. Click the **Apply** button to save the configuration, or click the **OK** button to save the configuration and close the window.
30. In the WinSetup workspace window select the tank icon:



31. Click the right mouse button and choose **Properties**, or from the **Service** menu choose **Tanks>Properties** to open the *Tank Configuration* window.
32. Select the *Value Entry* tab.



33. Ensure that **Value Source** is set to **Automatic** for the **Liquid Pressure** and **Vapor Pressure** measurement variables.
34. Click the **OK** button to save the configuration and close the window.
35. Check the result in the *Tank Inventory* window:
    a. Start the *TankMaster WinOpi* program.
    b. In the *WinOpi* workspace select the tank icon.
    c. From the View menu, choose the Tank>Tank Inventory option.

    If the calculations seem to be incorrect, see chapter *Checklist for Inventory Parameter Setup* in the *TankMaster WinOpi Reference Manual (Document No. 303028EN)* for more information.

Section 6 Device Handling

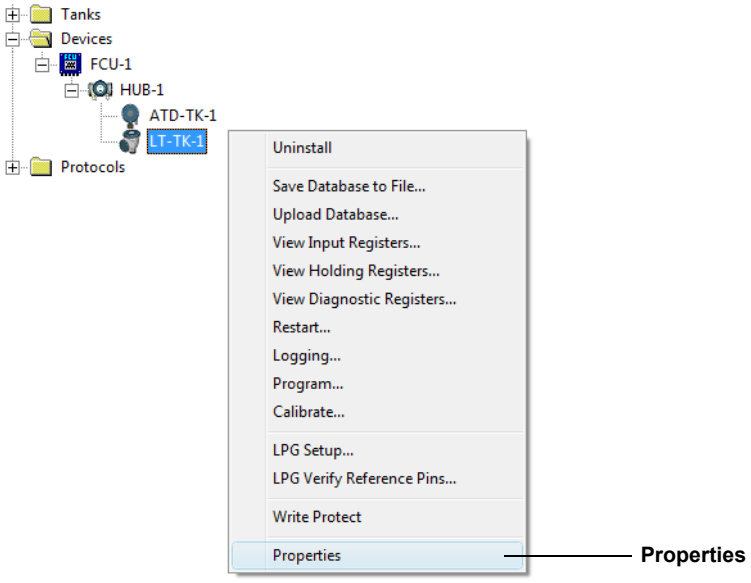
6.1 To Change Device Configuration . . . . . page 6-1
6.2 To Uninstall a Device . . . . . page 6-3

6.1 TO CHANGE DEVICE CONFIGURATION

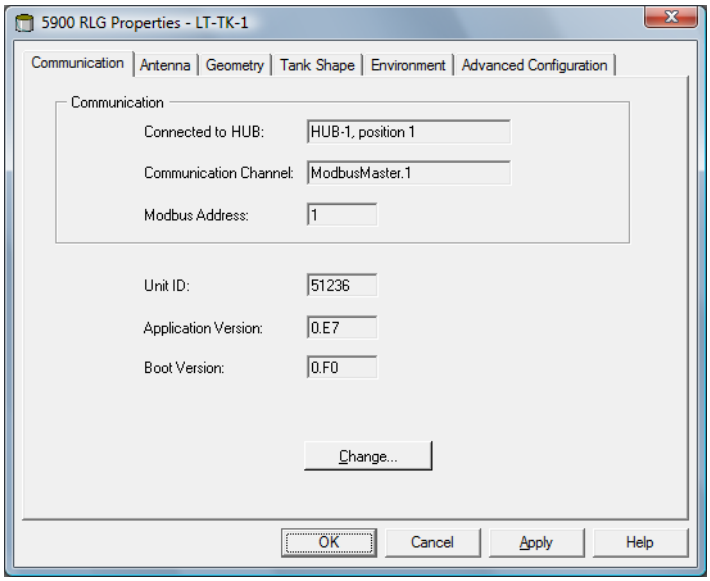
Once a device is installed and configured, you can modify the current settings at any time by opening the **Properties** dialog.

To open the Properties dialog do the following:

1. In the WinSetup *Workspace* window select the desired device.
2. Open the **Devices** folder and select the device icon.



3. Click the right mouse button and choose the **Properties** option, or from the **Service** menu choose the **Devices/Properties** option.
4. The device properties window (*5900S RLG Properties* window in this example, see the next page) appears with various tabs allowing you to change the current device settings.



A number of tabs are available for configuration of communication parameters, tank geometry, device specific parameters and advanced configuration options.

Some of the tabs refer to the different steps in the device installation wizard. Similar dialogs are available for other device types as well, for example the Rosemount 2410 Tank Hub.

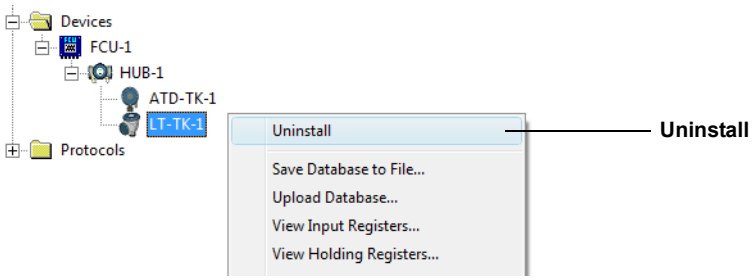
See *Section 5: Installing a Raptor Level Gauging System* for detailed descriptions on how to configure various devices.

6.2 TO UNINSTALL A DEVICE

A device can be uninstalled from the WinSetup workspace at any time. However, the associated tank must be uninstalled first. As an alternative you may keep the tank by disconnecting the device from the associated tank before the device is uninstalled.

To uninstall a device

1. Start by uninstalling the associated tank, see *"To Uninstall a Tank" on page 5-113*.



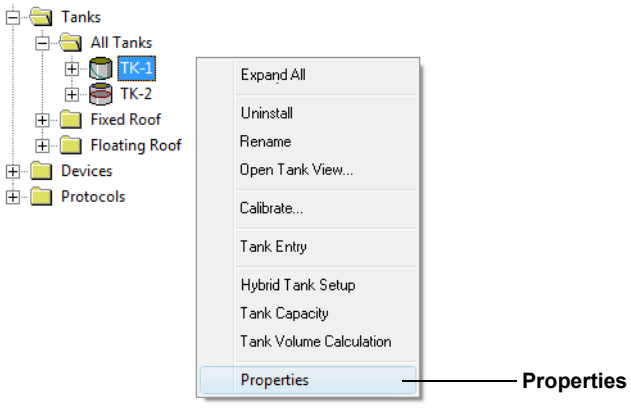
2. In the WinSetup workspace, select the device and click the right mouse button.
3. Choose the **Uninstall** option.

   Now the device is removed from the WinSetup workspace.

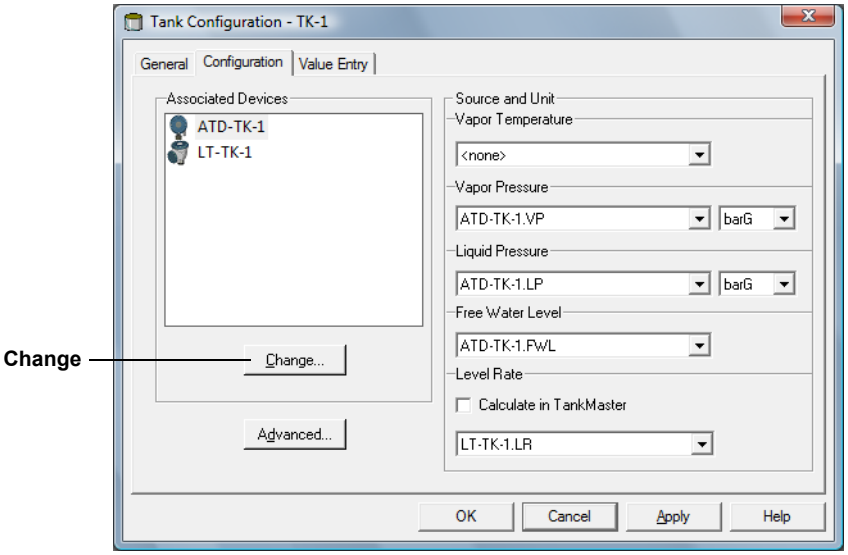
To uninstall a device without uninstalling the tank

If you prefer to keep the tank, you can disconnect it from the device and then uninstall the device:

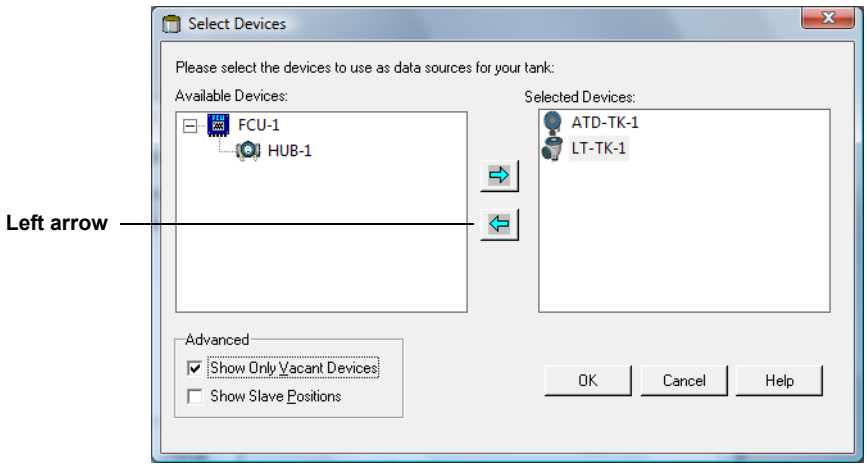
1. In the WinSetup workspace, select the desired tank and click the right mouse button.



2. Choose the **Properties** option and select the **Configuration** tab.

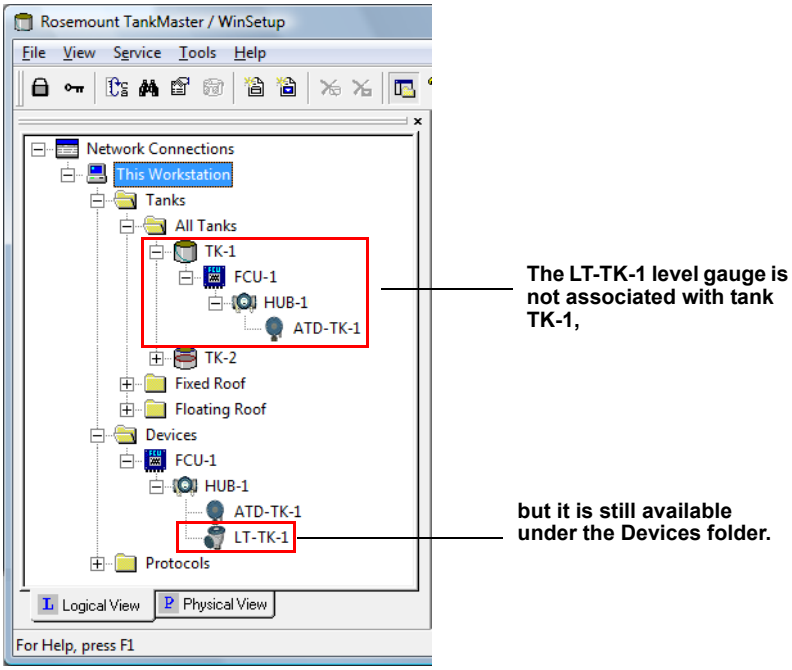


3. Click the **Change** button.

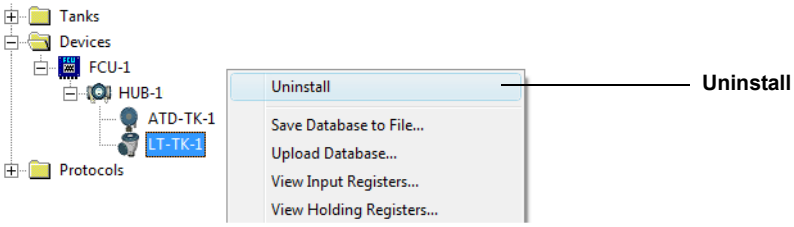


4. In the right-hand side of the *Select Devices* window, select the device and click the ⇦ arrow button. The device will be removed from the *Selected Devices* pane to the *Available Devices* pane on the left-hand side.
5. Click the **OK** button.

6. Open the **Tanks** folder:



7. Verify that the device (LT-TK-1 in this case) is no longer associated with the tank.
8. Open the **Devices** folder:



9. Select the device and click the right mouse button.
10. Choose the **Uninstall** option.

    Now the device is removed. However, the tank is still available in the WinSetup workspace.

Section 7 Service Functions

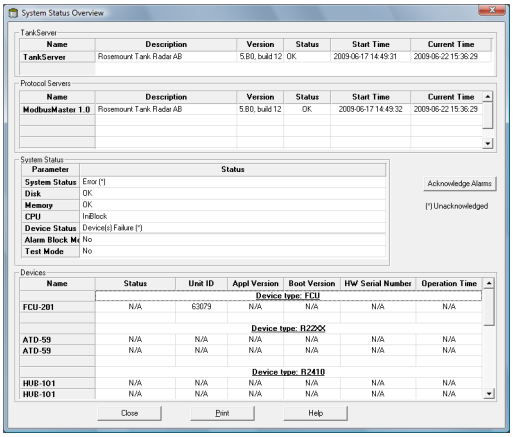
7.1 System Status . . . . . page 7-1
7.2 Customizing the Tools Menu in WinSetup . . . . . page 7-2
7.3 User Defined Temperature Conversion . . . . . page 7-4
7.4 Viewing Input and Holding Registers . . . . . page 7-8
7.5 To Edit Holding Registers . . . . . page 7-9
7.6 View Diagnostic Registers . . . . . page 7-11
7.7 Logging Measurement Data . . . . . page 7-14
7.8 Saving and Loading Database Registers . . . . . page 7-15
7.9 Upgrading The Device Software . . . . . page 7-18
7.10 Tank Scan . . . . . page 7-20
7.11 Viewing Tank Data . . . . . page 7-33
7.12 Viewing Alarm Status . . . . . page 7-35
7.13 Protocol Handling . . . . . page 7-37
7.14 TankMaster Administrator . . . . . page 7-44

7.1 SYSTEM STATUS

The **System Status Overview** shows status and properties for the overall system, Tank Server, Protocol Servers, and devices.

To open the **System Status Overview** do the following:

1. Select a workstation in the *Workspace* window.
2. Click the right mouse button and choose **System Status Overview,** or from the **Service** menu choose **Servers>System Status Overview**.

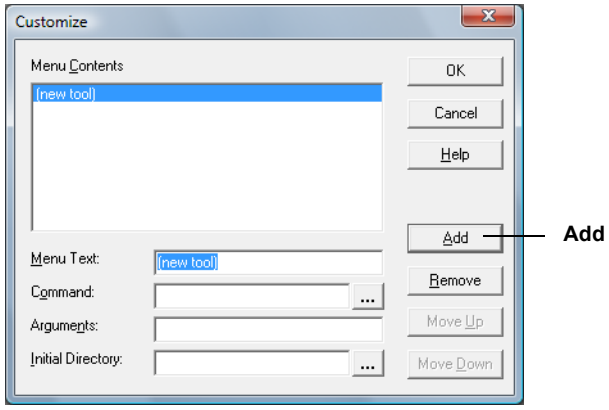


7.2 CUSTOMIZING THE TOOLS MENU IN WINSETUP

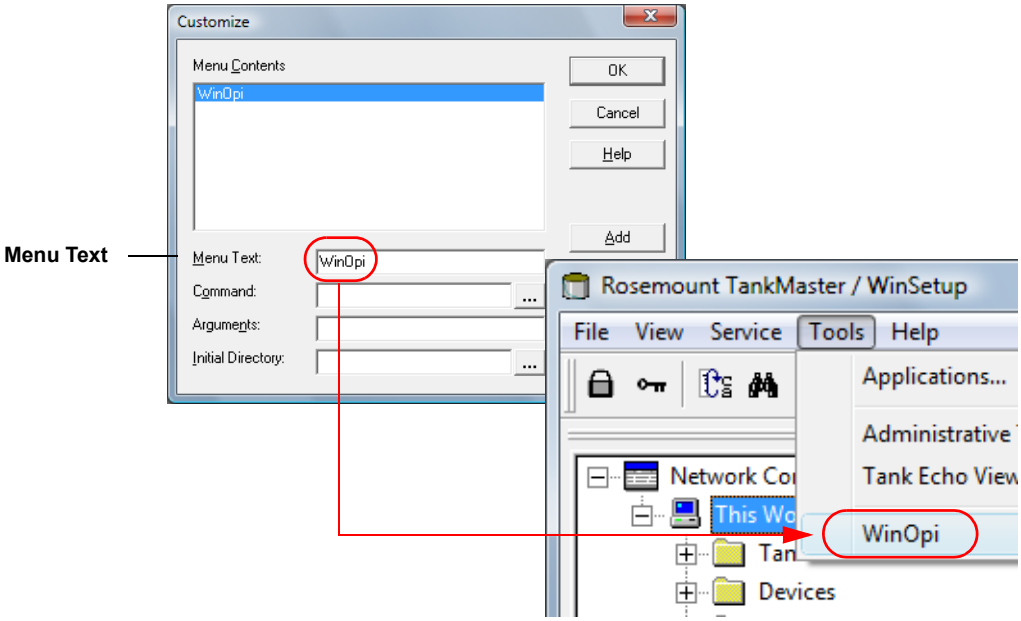
To add custom options to the Tools menu do the following:

1. Choose the **Tools>Applications** menu option.

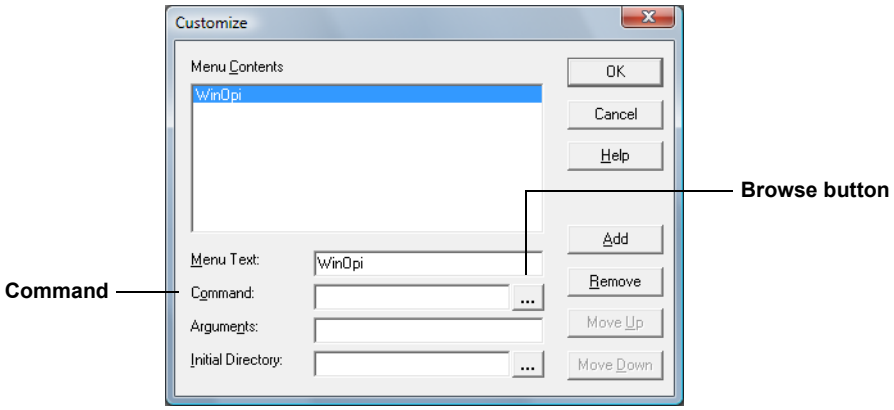
   Response: the Customize window appears:



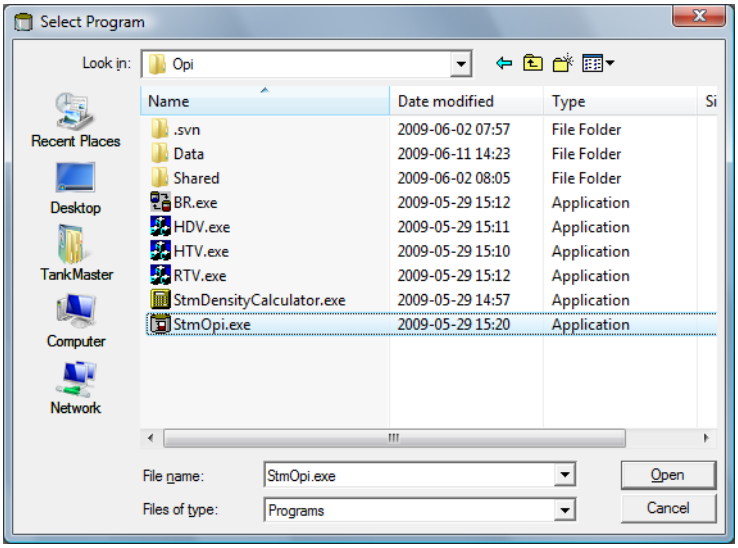
2. Click the **Add** button to add a new menu option to the Tools menu.



3. In the **Menu Text** field type the text you would like to appear in the Tools menu.



4. Press the ... button next to the **Command** field.



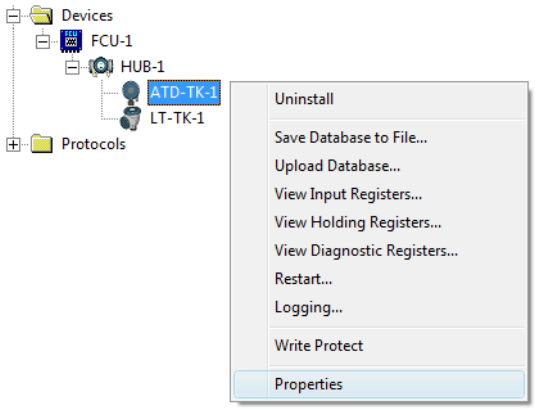
5. Browse to the program file that will be associated with the new Tools menu option as given in the Menu Text field.
6. Click the Open button and return to the *Customize* window.
7. In the Arguments field type any argument that you want to add to the command line. This line is usually left blank.
8. Click the **OK** button.
9. In the **Tools** menu, choose the new menu option and verify that the associated application starts as expected.

7.3 USER DEFINED TEMPERATURE CONVERSION

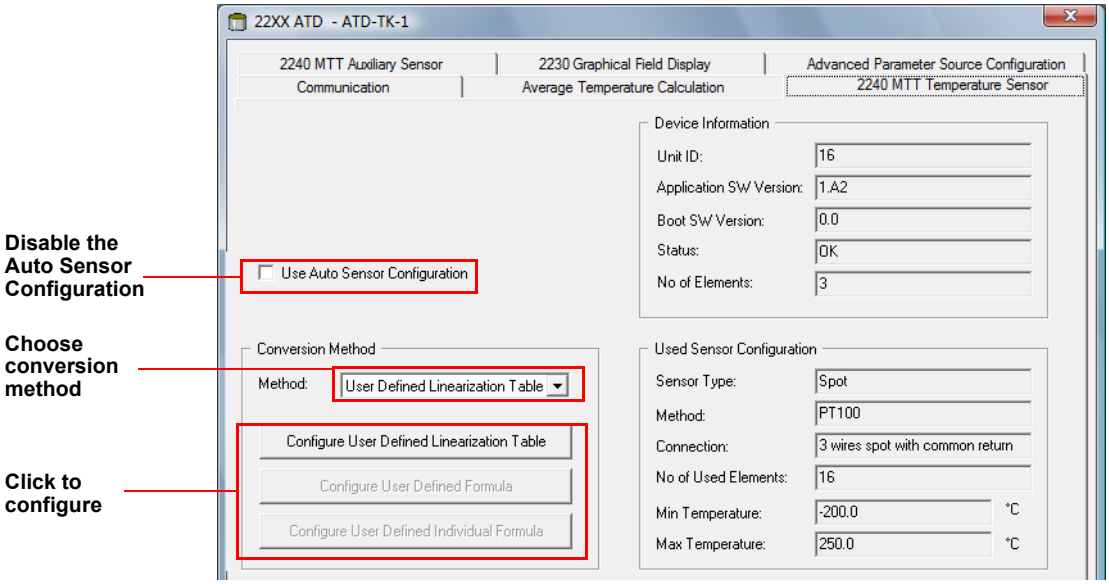
The Rosemount 2240S Multi-input Temperature Transmitter supports the use of non-standard spot temperature sensors. For these type of temperature elements you can specify the relation between temperature and electrical resistance with tables or mathematical formulas.

To enable and configure the different conversion methods:

1. In the WinSetup workspace, select the **ATD** device icon.
2. Click the right mouse button and choose the **Properties** option.



3. In the *22XX ATD* window, select the *2240S MTT Temperature Sensor* tab:



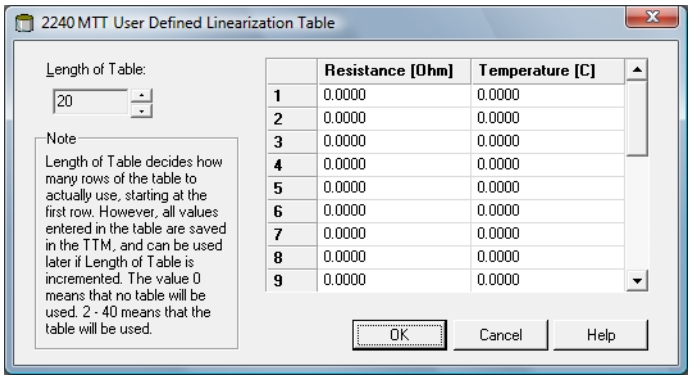
4. Disable **Use Auto Sensor Configuration**.
5. In the **Conversion Method** scroll menu, choose one of the user defined conversion methods.
6. Click the configuration button that corresponds to the selected user defined conversion method.

7.3.1 User Defined Linearization Table

When using a resistance temperature sensor, the electrical resistance values can be converted to temperature values by using a table of resistance and temperature values.

To create a conversion table:

1. In the *2240S MTT Temperature Sensor* window, choose conversion method *User Defined Linearization Table*.
2. Click the **Configure User Defined Linearization Table** button:



3. Specify the number of conversion points in the **Length of Table** input field.
4. Type resistance and temperatures values into the **Resistance [Ohm]** and **Temperature [C]** columns.
5. Click the **OK** button to store the linearization table in the temperature transmitter's database registers.

7.3.2 User Defined Formula

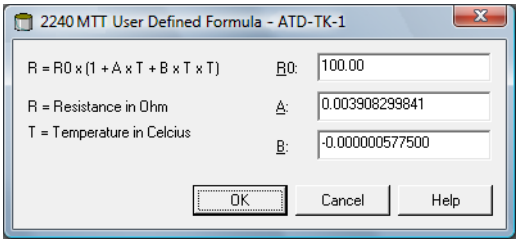
For a resistance temperature sensor, the relation between temperature and resistance can be specified by a mathematical formula:

$R=R_0*(1+A*T+B*T^2)$

where **R** is the resistance at temperature **T**, $\mathbf{R_0}$ is the electrical resistance at zero degrees Celsius, and A and B are constants.

To create a conversion formula:

1. In the *2240S MTT Temperature Sensor* window, choose conversion method *User Defined Formula*.
2. Click the **Configure User Defined Formula** button:



3. Enter the parameters R_0, A and B in the corresponding input fields.
4. Click the **OK** button to store the R_0, A and B parameters in the temperature transmitter's database registers.

7.3.3 User Defined Individual Formula

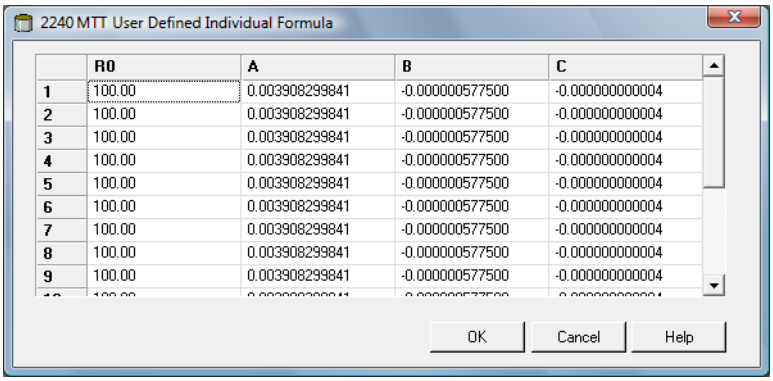
When using *User Defined Individual Formula,* a mathematical formula is used for each individual temperature element:

$R=R_0*(1+A_N*T+B_N*T^2+C_N*T^3)$, where

- R is the resistance at temperature T
- R_0 is the resistance at zero degrees Celsius
- A, B, and C are individual constants for each element
- N is the number of temperature sensors

To create an individual conversion formula:

1. In the *2240S MTT Temperature Sensor* window, choose conversion method *User Defined Individual Formula*.
2. Click the **Configure User Defined Individual Formula** button:



3. Enter parameters for each individual temperature element.
4. Click the **OK** button to store the formula in the temperature transmitter's database registers.

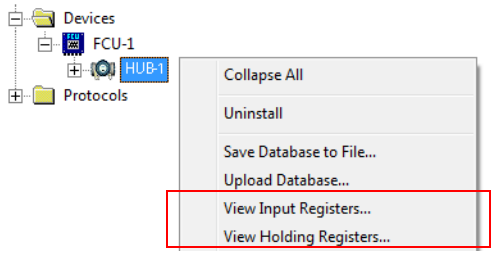
7.4 VIEWING INPUT AND HOLDING REGISTERS

In a Rosemount Raptor system measurement data is continuously stored in **Input registers** of devices such as the Rosemount 2410 Tank Hub, Rosemount 5900S Radar Level Gauge, and other devices. By viewing the input registers of a device, you can verify that the device is working properly.

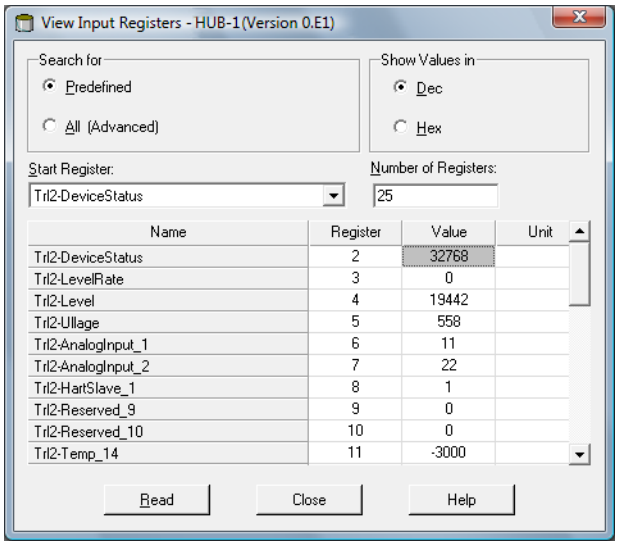
Holding registers store various transmitter parameters used to control the measurement performance.

To view input or holding registers of a certain device do the following:

1. In the WinSetup *Workspace*, select the device icon:



2. Click the right mouse button and choose the **View Input/Holding Registers** option, or from the **Service** menu choose **Devices>View Input/Holding Registers**.



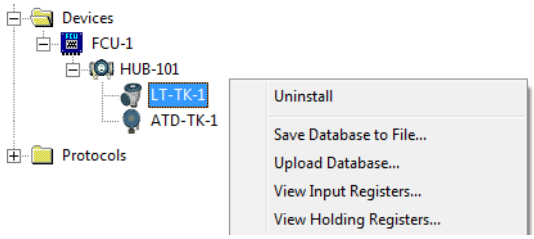
3. Choose **Predefined** if you would like to see a basic selection of database registers.
   For advanced service the **All** option allows you to view a range of registers. Specify a start value in the **Start Register** input field, and the total number of registers to be displayed in the **Number of Registers** field (1-500).
4. In the *Show Values in* pane, choose the appropriate register format Decimal or Hexadecimal.
5. Click the **Read** button to upload the contents of the device database register.

7.5 TO EDIT HOLDING REGISTERS

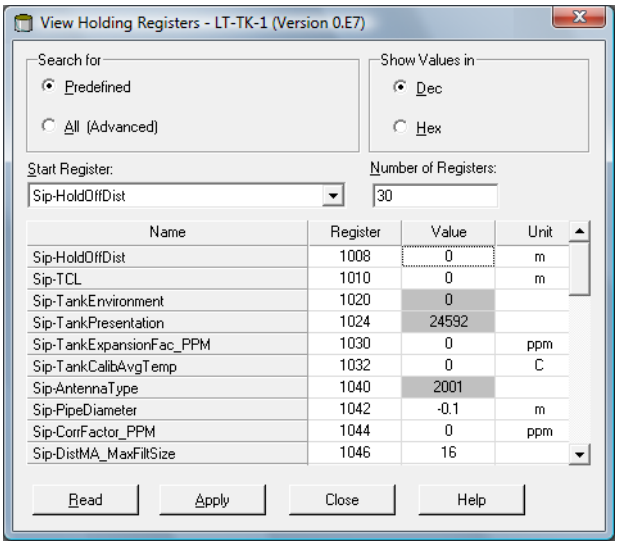
Most Holding registers can be edited simply by typing a new value in the appropriate **Value** input field. Some holding registers (marked grey in the Value column) can be edited in a separate window. In this case you can choose from a list of options or you can change separate data bits.

To edit a holding register, do the following:

1. In the WinSetup *Workspace*, select the device icon:



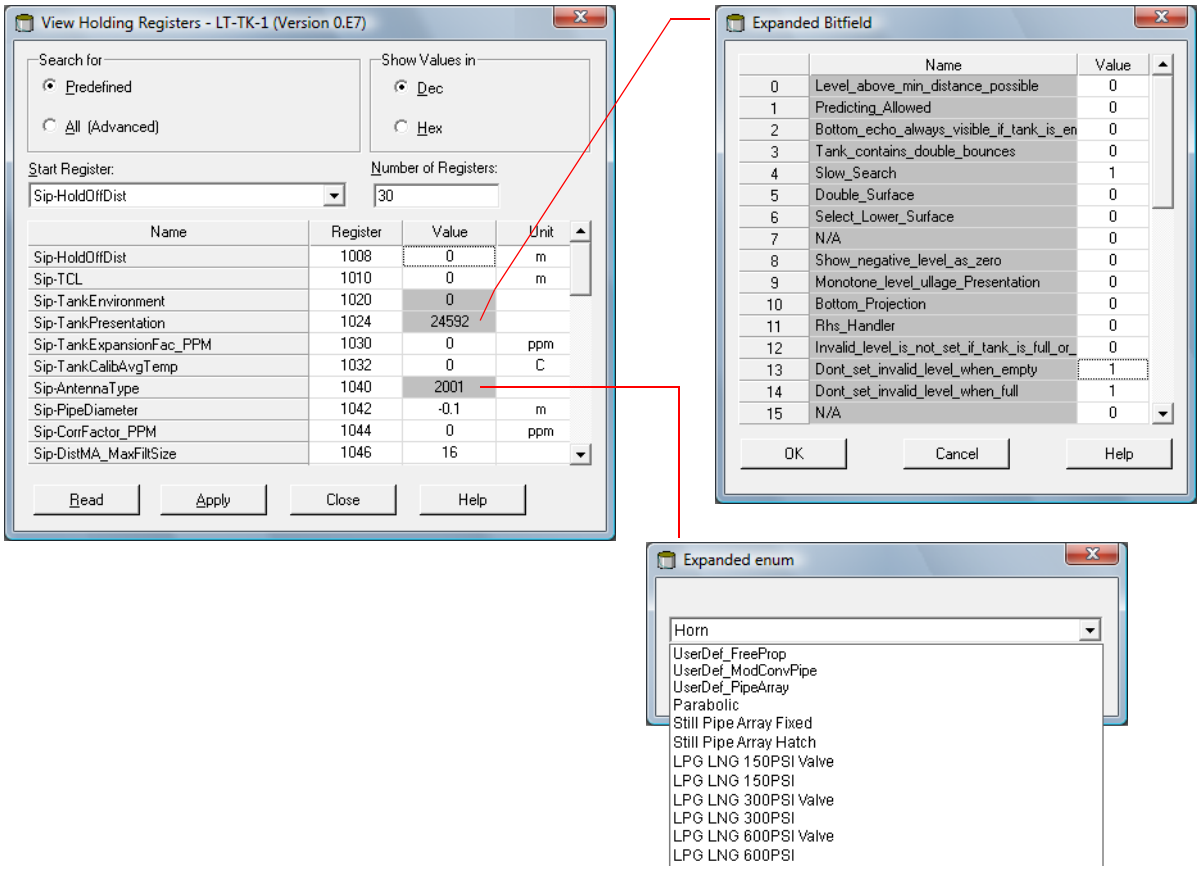
2. Click the right mouse button and choose the **View Holding Registers** option, or from the **Service** menu choose **Devices>View Holding Registers**.



3. In the **Value** column, to change the contents of input fields with white background color, put the cursor in the field and type a new value.

   To change input fields with grey background color, double click the field to open a new window for editing. Depending on Holding register type, an Expanded Enumerated or an Expanded Bitfield window is opened(1) Select from the list of options (Expanded Enumerated) or change the appropriate data bit (Expanded Bitfield).

(1) Contact Emerson Process Management/Rosemount Tank Gauging for more information about the different Holding register types.



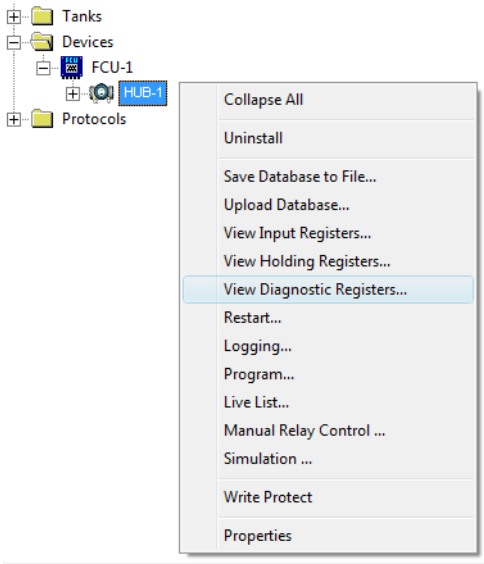
4. Click the **Apply** button to store the register data, or click the **Close** button to store and close the window.

7.6 VIEW DIAGNOSTIC REGISTERS

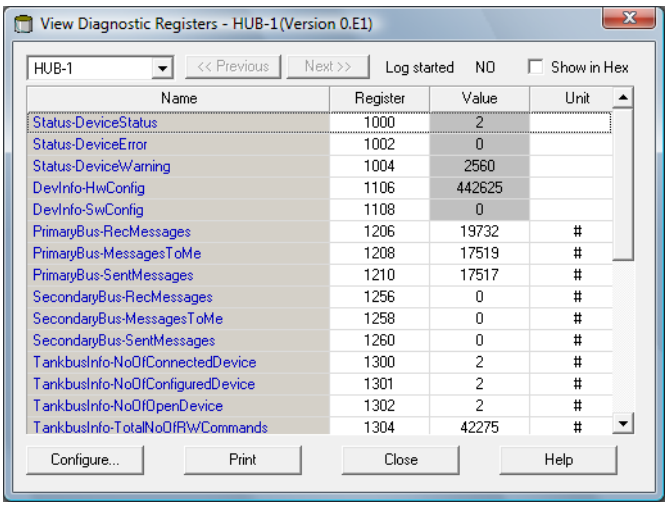
The *View Diagnostic Registers* window shows a predefined set of diagnostic input and holding registers. For each device there is a default set of diagnostic registers which can be changed in the *Configure Diagnostic Registers* window. Clicking the right mouse button on a handle opens a dialog window. The **Properties** option allows you to review or change parameter values.

To view and configure the diagnostic registers perform the following steps:

1. Select the device icon (for example a Rosemount 2410 or 5900S) in the *TankMaster WinSetup* workspace.



2. Click the right mouse button and choose **View Diagnostic Registers**.



The register values in this window are of read only type. They are loaded from the device as the window is opened.

A grey background color of the table cell in the Value column means that the register is of either Bitfield or ENUM type. An expanded Bitfield/ENUM window can be opened for that type of registers. Double-click the cell to open the Expanded Bitfield/ENUM window.

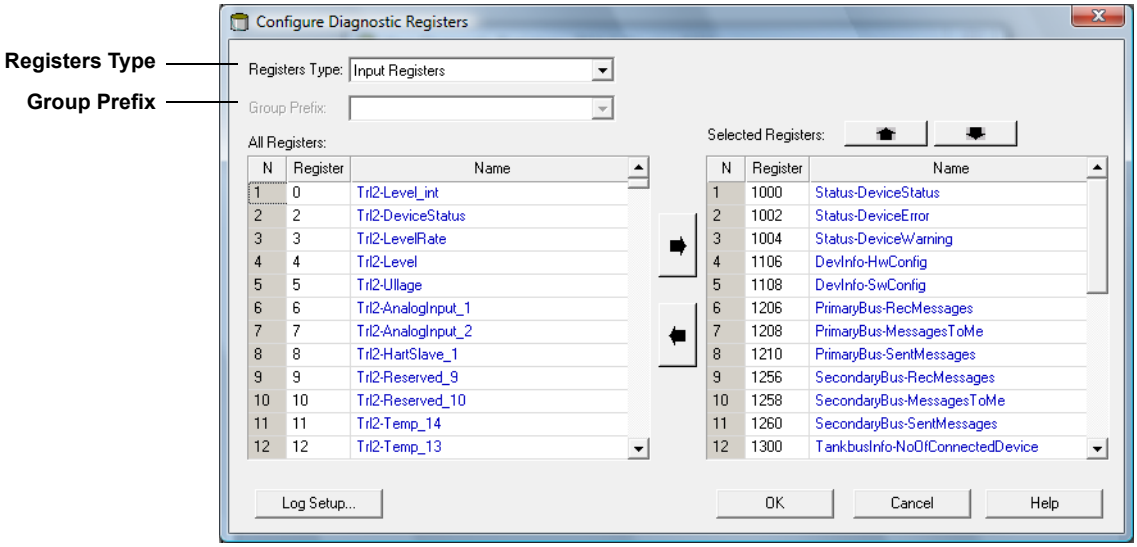
By selecting the **Show in Hex** check box, registers of Bitfield and ENUM type can be presented in hexadecimal format.

It is possible to view diagnostic registers for devices of the same type without closing the window and opening it again for a new device. Press Next >> or << Previous buttons to step to the next or previous device. Alternatively, another device can be selected from the pull down menu to the left.

The **Print** button lets you print the current register information.

7.6.1 The Configure Button

The **Configure** button opens the *Configure Diagnostic Registers* window which allows you to change the default selection of diagnostic registers for the *View Diagnostic Registers* window for the selected device type:



1. In the **Registers Type** pull down menu, choose **Holding** or **Input** registers. Input Registers are displayed in blue, Holding Registers in black.
2. The **Group Prefix** pull down menu lets you filter the list in the left pane.

NOTE!
Some devices do not support the Group Prefix feature.

3. A standard selection appears automatically in the Selected Registers pane on the right-hand side of the *Configure...* window. To add a register to the list, select it in the left pane and press the button.
   To remove a register from the right pane, select it and press the button.

4. The order in which registers are displayed in the *View Diagnostic Registers* window can be configured. Select a register in the right pane and press to move it upwards, or to move it downwards in the list.
5. The **Log Setup** button provides easy access to the *Register Log Scheduling* window, which allows you to setup a log schedule for automatic start and stop of register logging. See “Logging Measurement Data” on page 7-14 for more information.
6. Press **OK** to store the current configuration.

7.6.2 Restore to Default Setting

In case you wish to restore the *View Diagnostic Registers* window to the default setup, you need to remove the file that contains the current configuration data for the *View Diagnostic Registers* window.

To restore to the default setting do the following:

1. In Windows Explorer open the following folder:

   C:\Rosemount\TankMaster\Setup\Data,

   where C:\ is the drive letter associated with the hard disk on which TankMaster is installed.
2. Locate the configuration file for the device whose diagnostic register setup you wish to restore:

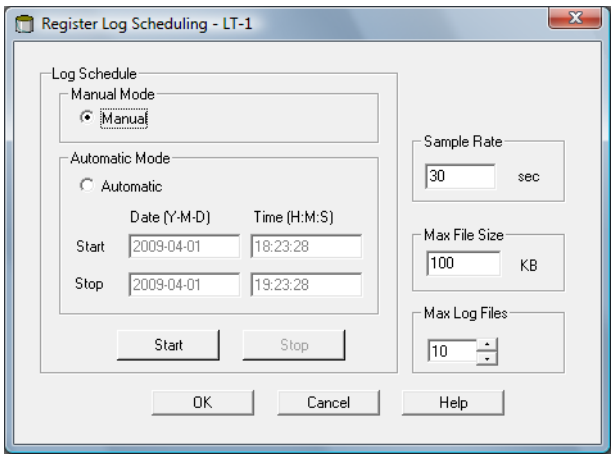
Device	Configuration file
2410 Tank Hub	R2410_diag.ini
5900S Radar Level Gauge	R5900_diag.ini
2240 Multi-Input Temperature Transmitter and Auxiliary Tank Devices (ATD)	R22XX_diag.ini

3. Remove the *.ini file, or rename it in case you wish to store the file for future use (for example R2410.old).
4. Start TankMaster WinSetup and open the *View Diagnostic Registers* window to verify that the *View Diagnostic Registers* window shows the default setting of diagnostic registers.

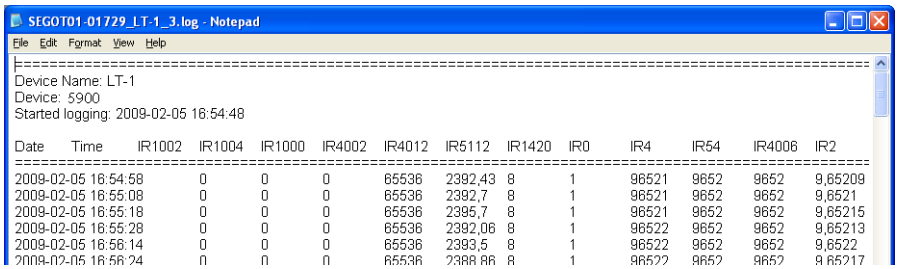
7.7 LOGGING MEASUREMENT DATA

Raptor devices such as the Rosemount 2410 and Rosemount 5900S support logging of diagnostic registers. This function is useful for verifying that the gauge works properly. The logging function can be accessed by using the *TankMaster WinSetup* program. To start logging do the following:

1. Start the *TankMaster WinSetup* program.
2. Select the device icon in the *WinSetup* workspace.
3. Click the right mouse button and choose **Logging**.



4. The **Manual** mode lets you start logging at any time. In **Automatic** mode you have to specify a Start and Stop time.
5. The resulting log file will not exceed the size specified by the Max File Size parameter.
   In automatic mode logging will proceed until the stop date and time is reached.
   In manual mode logging will proceed until it is stopped by clicking the Stop button.
   Logging will stop automatically when the number of log files is equal to the number given by the Max Log Files parameter.
6. The log file is stored as a plain text file and can be viewed in any word processing program. The log file is stored in the following folder: **C:\Rosemount\Tankmaster\Setup\Log**, where C is the disk drive where the TankMaster software is installed.
   The log file contains the same input registers as the *View Diagnostic Registers* window.
   You can change which input registers to be included in the log file by configuring the *View Diagnostic Registers* window, see “View Diagnostic Registers” on page 7-11 for more information.



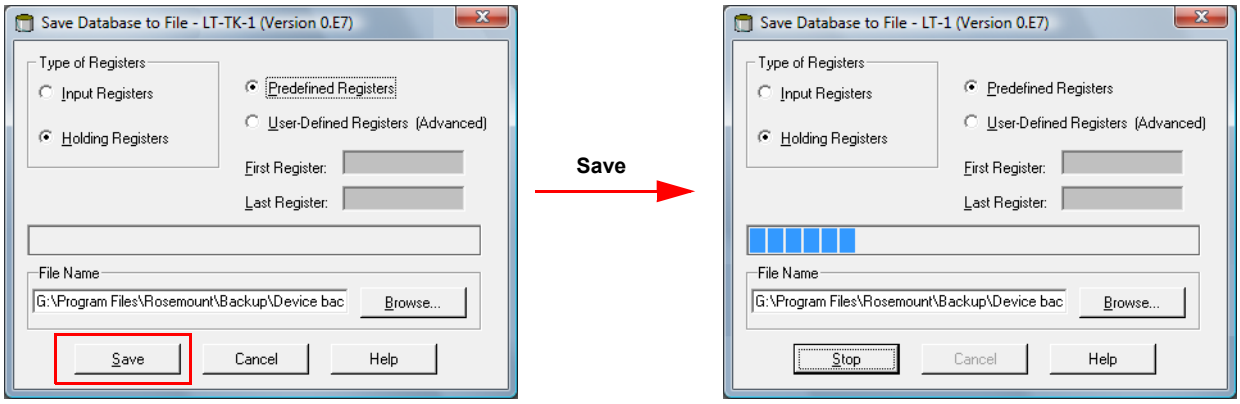
7.8 SAVING AND LOADING DATABASE REGISTERS

Input and Holding Registers of the Rosemount 5900S and the 2410 can be stored on disk. This can be useful for backup purposes and troubleshooting. Input and Holding registers can be saved for a single device or several devices simultaneously.

7.8.1 To Save Device Registers Single Device

To save configuration database registers (holding registers) to file for a single device do the following:

1. Start the TankMaster **WinSetup** program.
2. In the TankMaster WinSetup workspace window, click the right mouse button on the device icon.
3. Choose the **Save Database to File** option, or from the **Service** menu choose **Devices>Save Database to File**.



4. Select **Holding** registers.
5. Choose the **Predefined Registers** or the **User-Defined** option.
   The Predefined option stores the most frequently used registers.
   The User-defined option stores a specified range of Holding registers and should only be used for advanced service.
6. Click the **Browse** button, select a folder and type a file name.
7. Click the **Save** button to start saving the configuration database to file.

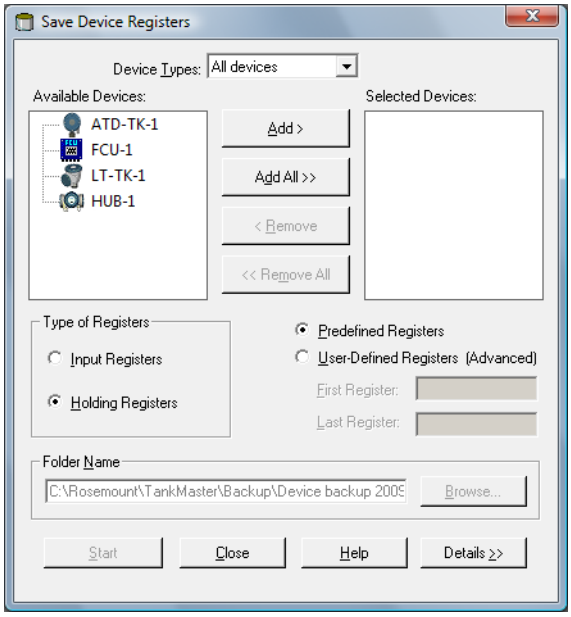
Input Registers can also be saved on disk for service and troubleshooting:

1. Select **Input Registers**.
2. Choose **Predefined Registers** or **User-Defined Registers**.
   The Predefined option stores the most frequently used registers.
   The User-defined option stores a specified range of Input registers.
3. For the User-defined option specify a range of registers by entering the the first and last register.
4. Click the **Browse** button, select a folder, and type a file name.
5. Click the **Save** button to save the register data to file.

7.8.2 To Save Device Registers Multiple Devices

To save a backup copy of the current configuration for multiple devices, do the following:

1. In the TankMaster WinSetup workspace, select the *Devices* folder.
2. Click the right mouse button and choose the **Save Database of All to Files** option, or from the **Service** menu choose **Devices>Save Database of All to Files**.



3. Select a device from the **Available Devices** pane and click the **Add** button in order to move it to the **Selected Devices** pane. Repeat for all devices you would like to include.
4. Select **Holding** registers.
5. Choose the **Predefined Registers** or the **User-Defined** option.
   The Predefined option stores the most frequently used registers.
   The User-defined option stores a specified range of Holding registers and should only be used for advanced service.
6. Click the **Browse** button, select a folder and type a file name.
7. Click the **Start** button to save the database backup.

Input Registers can also be saved on disk for service and troubleshooting:

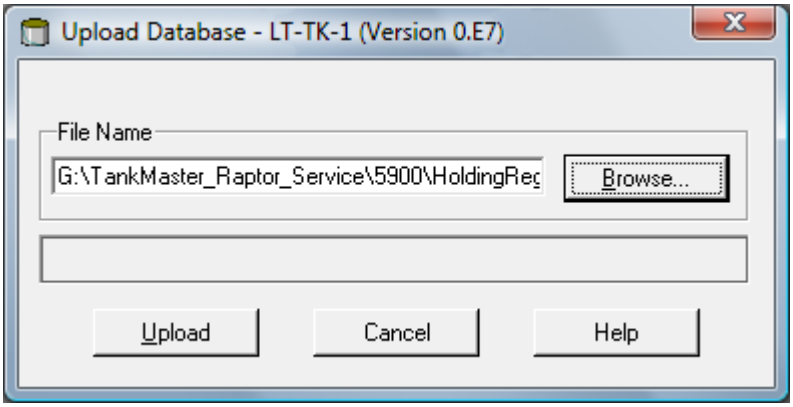
1. Select the devices you would like to include.
2. Select **Input Registers**.
3. Choose the **Predefined Registers** or the **User-Defined** option.
   The Predefined option stores the most frequently used registers.
   The User-defined option stores a specified range of Holding registers and should only be used for advanced service.
4. Click the **Browse** button and select a folder and a file name.
5. Click the **Start** button to save the file.

7.8.3 To Recover a Device Database

TankMaster WinSetup offers the option to replace the current holding register database with a backup database stored on disk. This can be useful, for example, when recovering configuration data.

To load a backup database to a device do the following:

1. Select the device icon in the WinSetup workspace.
2. Click the right mouse button and choose the **Upload Database** option, or from the **Service** menu choose **Devices>Upload Database**.



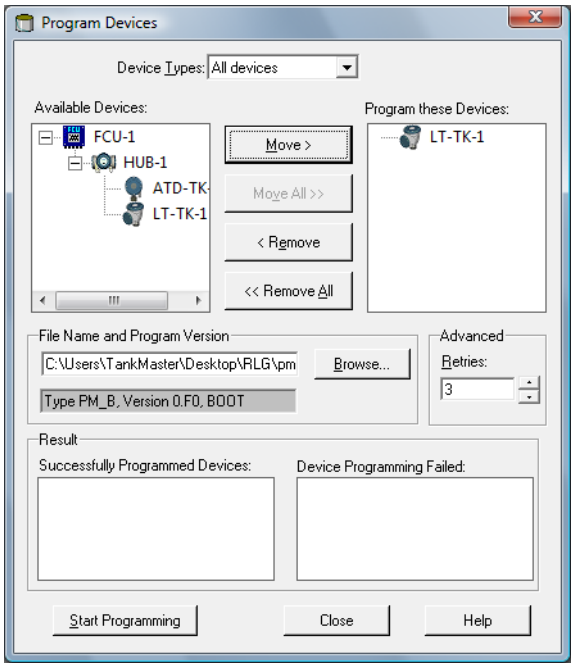
3. Type a file path and file name, or click the **Browse** button and choose a backup database file to be uploaded.
4. Click the **Upload** button to start uploading the recovery database.

7.9 UPGRADING THE DEVICE SOFTWARE

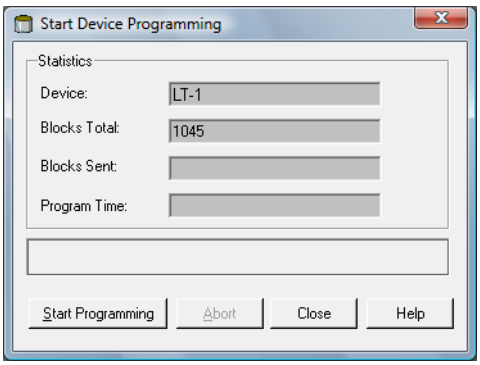
TankMaster WinSetup allows you to upgrade the software of Rosemount Raptor level gauges and other devices.

To upload new software do the following:

1. Make sure the devices are properly prepared for reprogramming.
2. In the *WinSetup Workspace,* select the **Devices** folder, or select a specific device in the Devices folder.
3. Click the right mouse button and choose the **Program All** option, or from the **Service** menu choose **Devices>Program All**.
   (For a single device, choose the **Program** option, or from the **Service** menu, choose the **Devices>Program** option).



4. Select the device to be programmed from the **Available Devices** pane and click the **Move** button. Repeat for each device to be programmed. Note that if a single device was selected in the *Workspace* window, it will appear automatically in the *Program These Devices* pane.
   Use the **Remove** button if you would like to change the list of devices to be programmed.
5. Click the **Browse** button to locate the appropriate software file.
6. Click the **Start Programming** button to open the *Start Device Programming* window:



7. Click the **Start Programming** button to activate device programming.

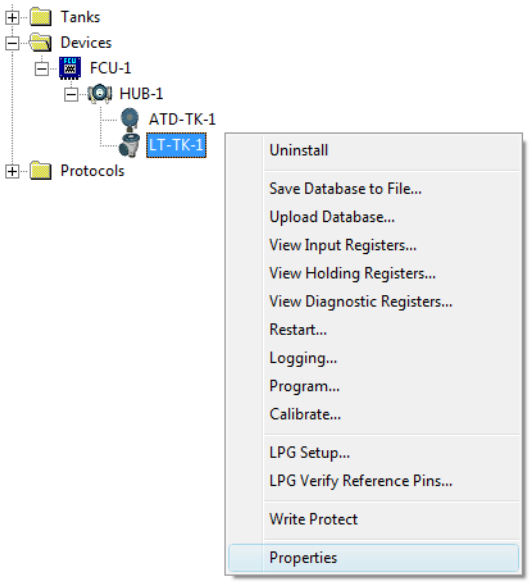
See, for example, the *Rosemount 5900S Reference Manual* (Document No. 300520EN) or the *Rosemount 2410 Reference Manual* (Document No. 300530EN) for further information on programming gauges and devices in the Rosemount Raptor system.

7.10 TANK SCAN

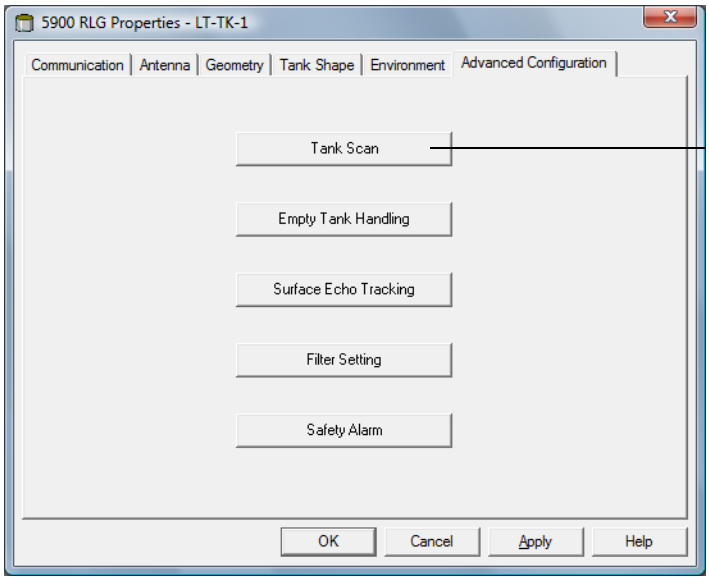
The *Tank Scan* window allows you to view tank echoes and setup the most important parameters to enable a radar level gauge such as the Rosemount 5900S to separate a surface echo from disturbing echoes and noise.

To open the *Tank Scan* window:

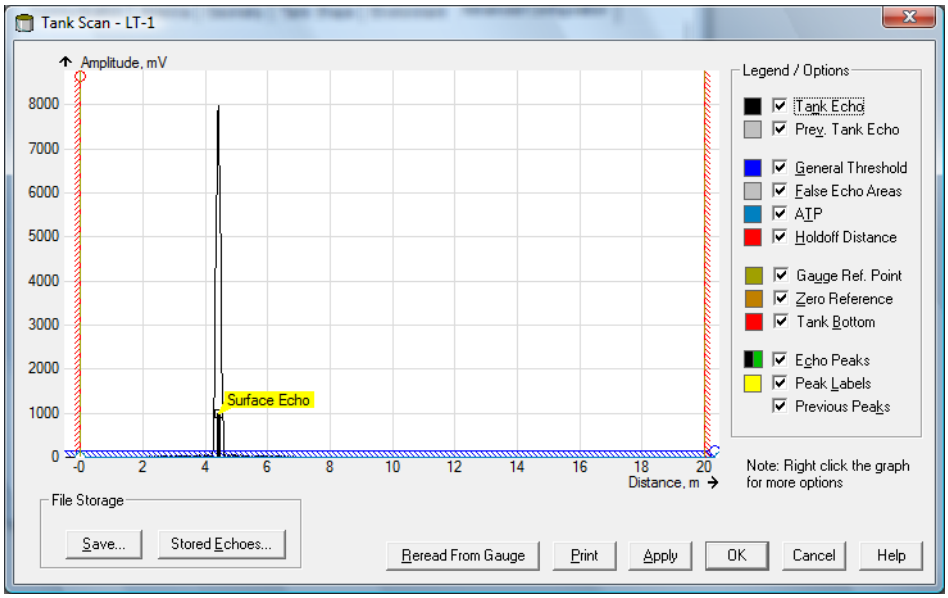
1. In the *WinSetup* workspace, select the 5900S gauge icon.



2. Click the right mouse button and choose the **Properties** option.



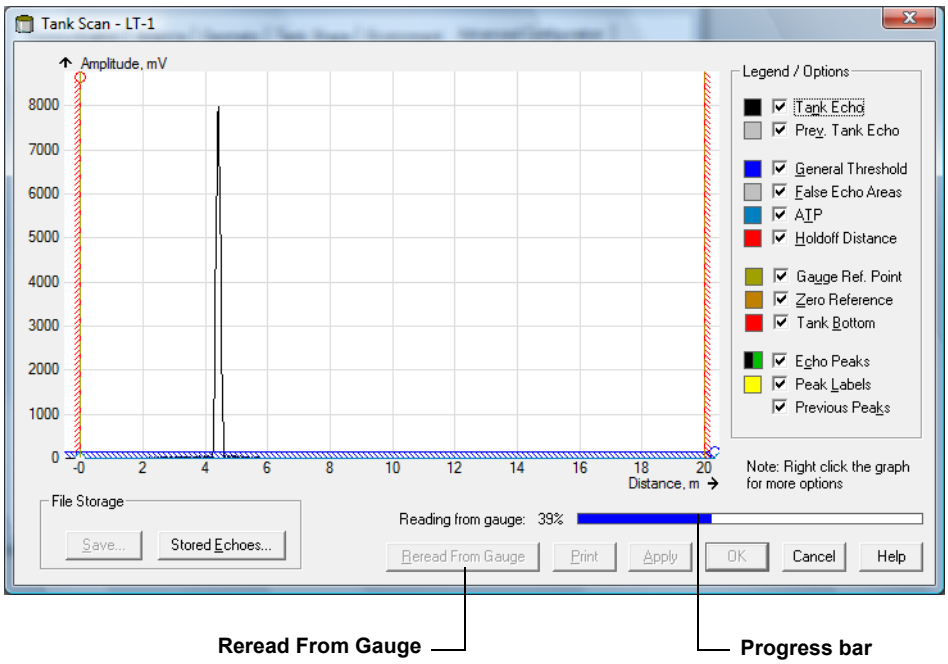
3. Select the *Advanced Configuration* tab and press the **Tank Scan** button.



4. The *Tank Scan* window contains the Graph Area, Legend/Options area, File Storage buttons, and various action buttons.

7.10.1 Graph Area

When the *Tank Scan* window opens, WinSetup reads tank data from the gauge. The process is indicated by a progress bar in the lower right corner of the *Tank Scan* window.

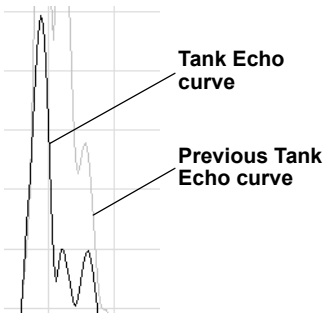
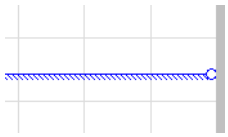
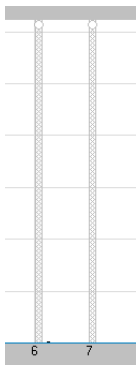


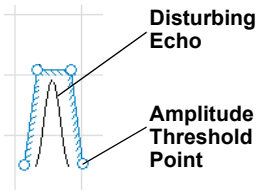
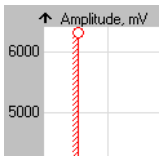
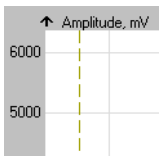
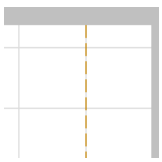
Once the reading process is finished, a tank scan graph is displayed that shows a peak referring to the product surface. The **Tank Scan** graph may also contain other peaks. In addition to the surface echo, there might be echoes from agitators or other obstacles in the tank. The Tank Scan function includes tools that allows you to configure the level gauge to distinguish between the surface peak and peaks from disturbing objects. See the following chapters for details.

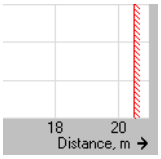
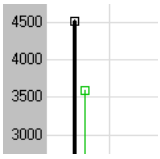
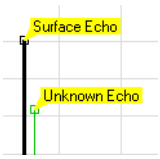
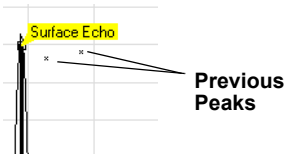
The Tank Scan graph can be refreshed at any time with the **Reread From Gauge** button. The new echo curve will appear as a black line and the previous curve as a grey line. The graph may show up to two old echo curves. An old echo peak will be marked by a small cross symbol. This can be used to compare the existing tank signal with previous signals.

7.10.2 Legend/Options

The following items can be shown in the graph area (check the appropriate box for each item to be shown):

Tank Echo	The black line shows the latest Tank Echo curve, and the grey lines show previous Tank Echo curves (maximum two). 
Prev. Tank Echo (Previous Tank Echo)	See Tank Echo.
General Threshold	The **General Amplitude Threshold** is shown in blue. Echoes with an amplitude below the **General Amplitude Threshold** will be filtered out by the level gauge. 
False Echo Areas	The False Echo function is used to improve the performance of the gauge when the surface is close to a horizontal surface of a stationary object in the tank. The object causes an echo when it is above the surface. Added **False Echo Areas** are shown in grey: 

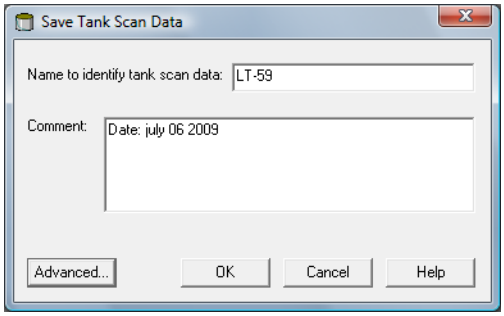
ATP (Amplitude Threshold Points)	A weak disturbing echo can be filtered out by creating a curve of **Amplitude Threshold Points**. 
Holdoff Distance	The **Holdoff Distance** defines how close to the Gauge Reference Point a level value is accepted. The **Holdoff Distance** is shown in red. 
Gauge Ref. Point (Gauge Reference Point)	The **Gauge Reference Point** is shown as a dashed (olive colored) line: 
Zero Reference	The **Zero Reference** (zero level; dipping datum point) close to the bottom of the tank, is defined by the Tank Reference Height (R). It is shown as a dashed (sand colored) line: 

Tank Bottom	The **Tank Bottom** is shown in red: 
Echo Peaks	**Echo Peaks** are shown in black for the Surface Echo and in green for unknown echoes: 
Peak Labels	**Peak Labels** are shown for the Surface Echo and for unknown echoes: 
Previous Peaks	**Previous Peaks** are shown for the Surface Echo and for unknown echoes: 

7.10.3 File Storage

To save Tank Scan data displayed in the Graph Area

1. In the *Tank Scan* window click the **Save** button.



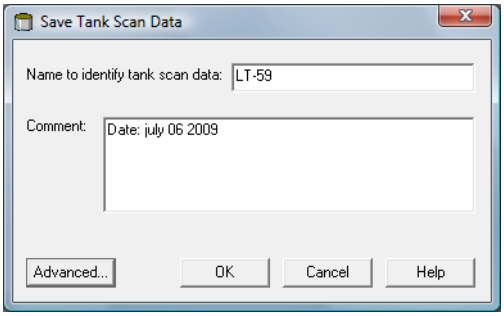
2. Enter a name to identify the tank scan data. You may also type a comment in the Comment field (not required). This can for example be used to describe any special circumstances under which the Tank scan data was obtained.
3. Press the **OK** button.

NOTE!
The default data storage file is named *StrTankScanII.dat*. The file is stored in the following folder: C:\Program Files\Rosemount\Lib\Data\.

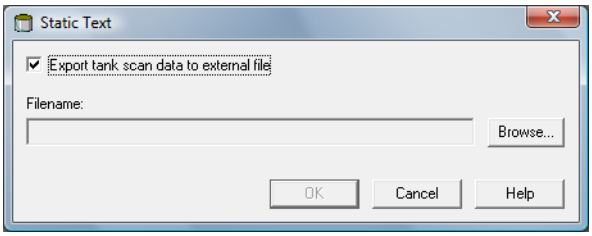
To export tank scan data to an external file

Tank scan data can be saved to file for viewing with the Tank Echo Viewer (Tools>Tank Echo Viewer):

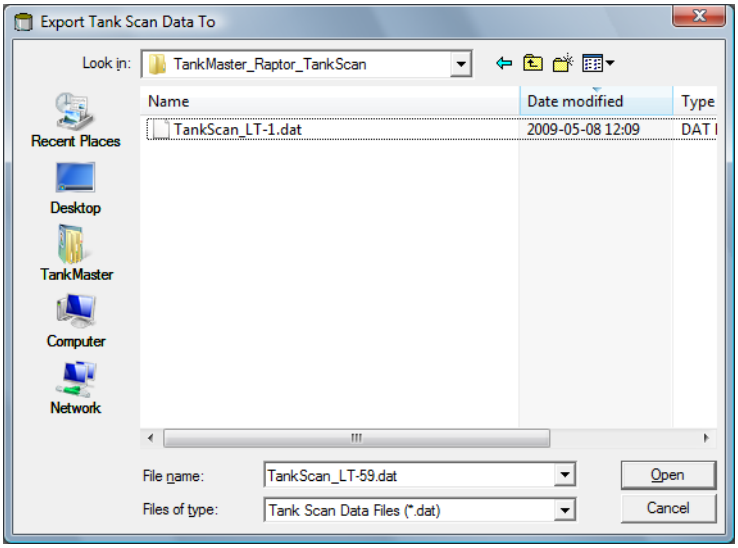
1. In the *Tank Scan* window click the **Save** button to open the *Save Tank Scan Data* window:



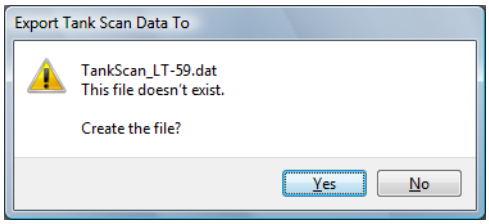
2. Enter a name to identify the tank scan data. You may also type a comment to describe any special circumstances when the Tank scan data was obtained.
3. Press the **Advanced** button.



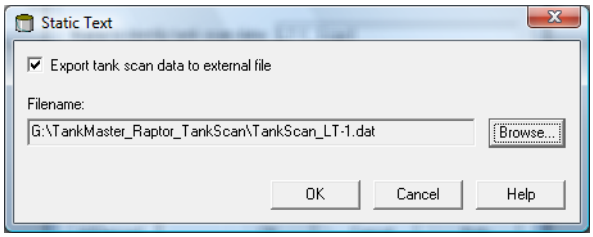
4. Select the *Export tank scan data to external file* check box.
5. Press the **Browse** button.



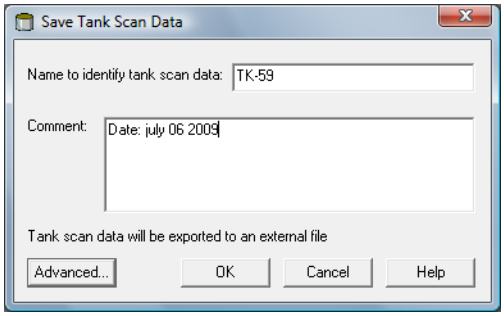
6. Browse to a destination folder and type a name in the File name input field. Press the **Open** button



7. Press **Yes** to create the file.



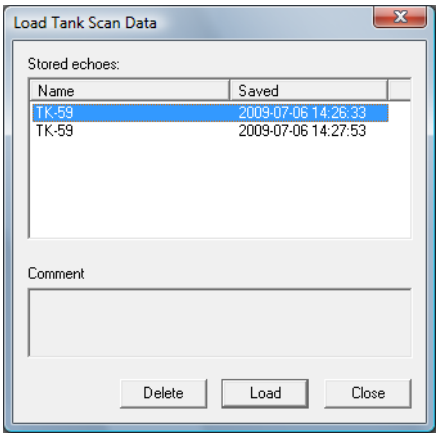
8. Press **OK**.



9. Press **OK** to export the tank scan data.

To load data from a saved file into the Graph Area

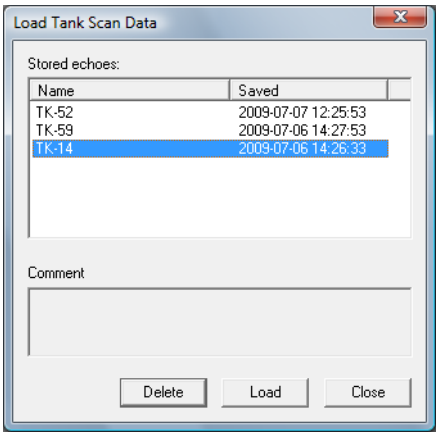
1. In the *Tank Scan* window press the **Stored Echoes** button.



2. Select the file to be loaded.
3. Press the **Load** button.

To delete a saved file

1. In the *Tank Scan* window press the **Stored Echoes** button.



2. Select the file you want to delete.
3. Press the **Delete** button.

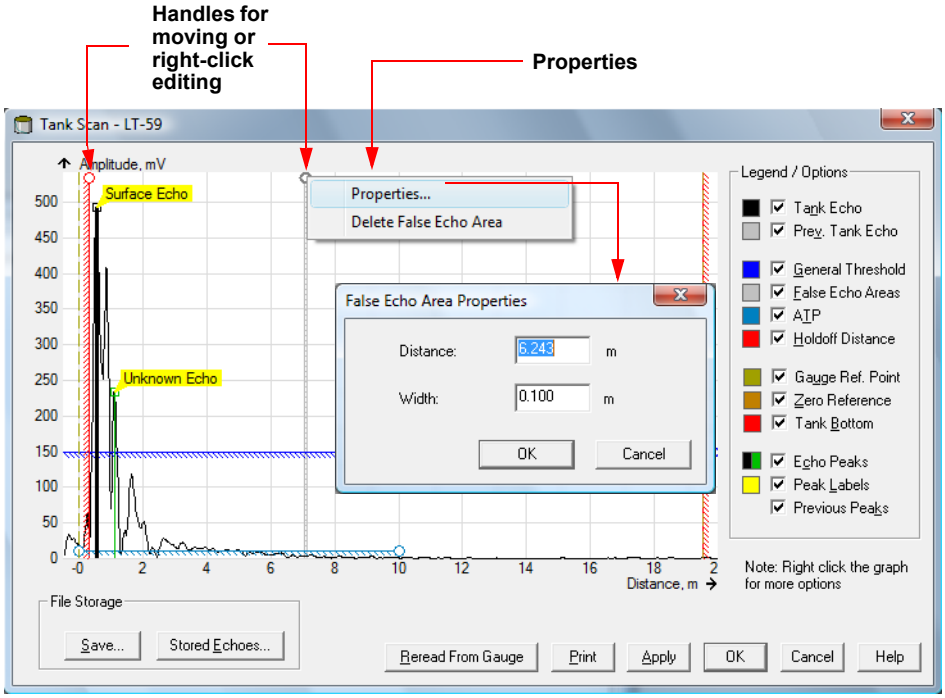
7.10.4 Action Buttons

The following buttons can be found in the *Tank Scan* window:

Save	See “File Storage” on page 7-26.
Stored Echoes	See “File Storage” on page 7-26.
Reread From Gauge	At any time, you can refresh tank echo and echo peaks with the **Reread From Gauge** button. The Tank Scan will display the new echo curve as a black line, and up to two previous echo curves in grey color. The previous echo peaks will appear with small crosses.
Print	Opens the print dialogue and prints the *Tank Scan* window.
Apply	When changing a parameter that affects echo peak detection (e.g. General Amplitude Threshold), you will have to press the **Apply** button to write these settings to the internal memory of gauge. It takes a few seconds for the gauge to update the echo peak data (up to 30 seconds due to the echo peak filtering function in the gauge). Finally, press the **Reread from Gauge** button to update the echo peak information in the graph area.
OK	Applies changes and closes the window.
Cancel	Cancels all changes.
Help	Opens the online help for the window.

7.10.5 Editing

All the elements having handles can be edited. Each handle may be moved by using the mouse pointer.



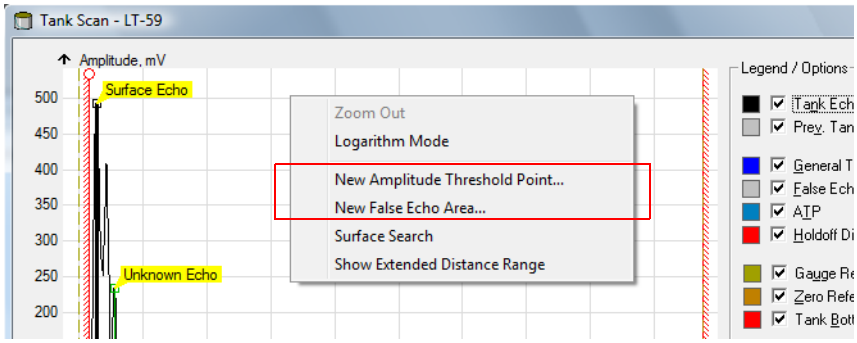
Clicking the right mouse button on a handle opens a dialog window. The **Properties** option allows you to review or change parameter values.

The following parameters can be edited via moving or right-clicking a handle:

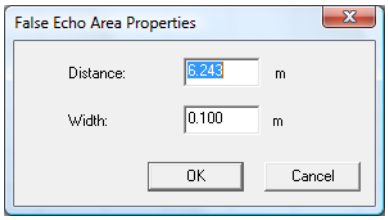
- General Amplitude Threshold
- Amplitude Threshold Point
- False Echo Area
- Hold Off Distance

To add a False Echo Area or an Amplitude Threshold Point

1. Click the right mouse button in the graph area where you would like to add a *False Echo Area* or an *Amplitude Threshold Point*:



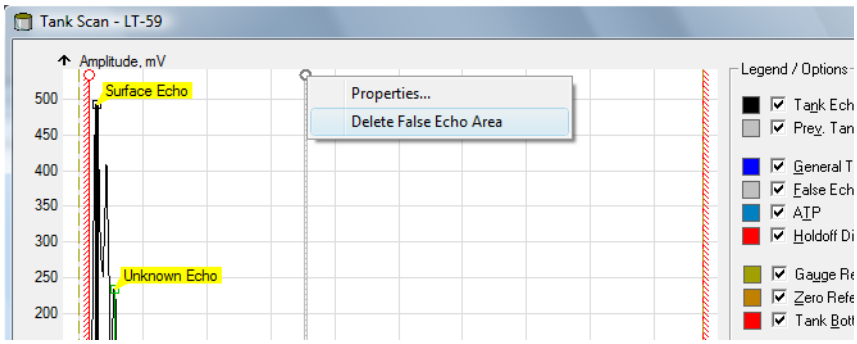
2. Select a menu item in the popup menu. In the example above, the **New False Echo Area** option was chosen:



3. Enter the new data and click the **OK** button.

To delete a False Echo Area or Amplitude Threshold Point

1. Right-click the handle of the False Echo Area or Amplitude Threshold Point to be deleted:



2. Select the **Delete False Echo Area** (or Delete Amplitude Threshold Point) option.

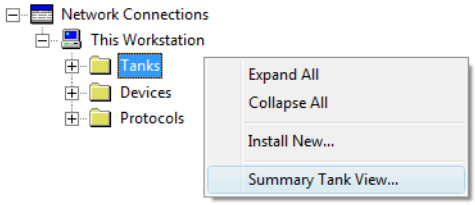
7.11 VIEWING TANK DATA

WinSetup offers the option to view data from a single tank or a group of tanks. Various parameters such as Level, Level Rate, and Average Temperature can be displayed. The *Setup Tank View* window lets you specify the desired set of parameters. See “Tank View Layout” on page 5-21 for more information.

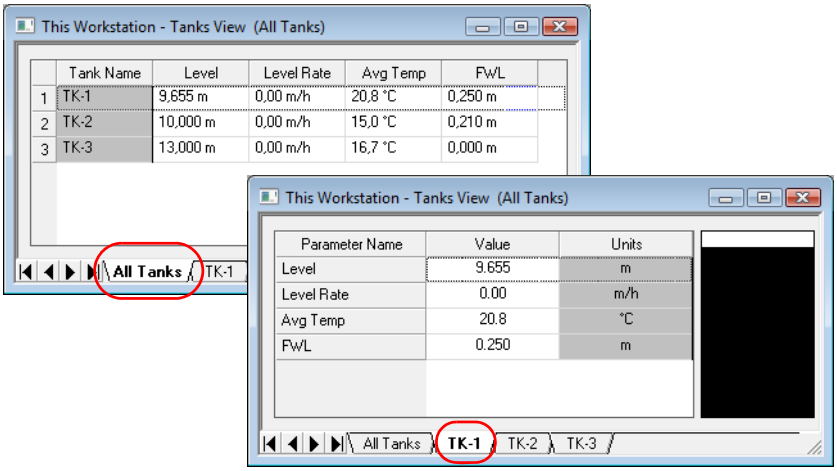
7.11.1 Viewing Data from All Tanks

To view measurement data from all tanks, do the following:

1. In the WinSetup workspace, select the **Tanks** folder.



2. Click the right mouse button and choose **Summary Tank View**, or from the **Service** menu choose **Tanks/Summary Tank View**.

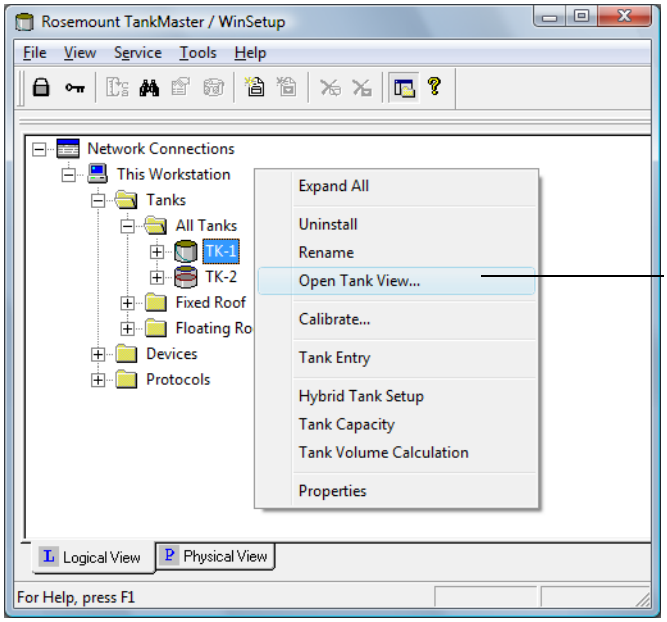


3. Choose the **All Tanks** tab for a complete list of all tanks, or choose a view that includes a bar graph for one tank at a time by selecting the appropriate tab.

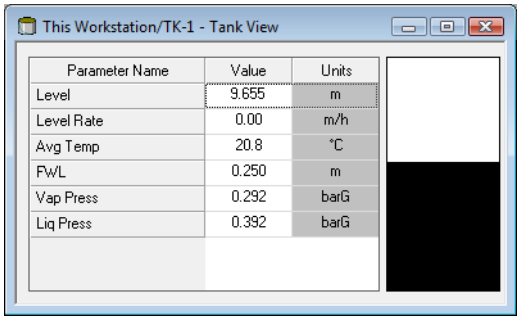
7.11.2 Viewing Data From a Single Tank

To view measurement data for a single tank, do the following:

1. In the WinSetup workspace, select the desired tank icon.



2. Click the right mouse button and choose the **Open Tank View** option, or from the **Service** menu choose **Tanks/Open Tank View**:



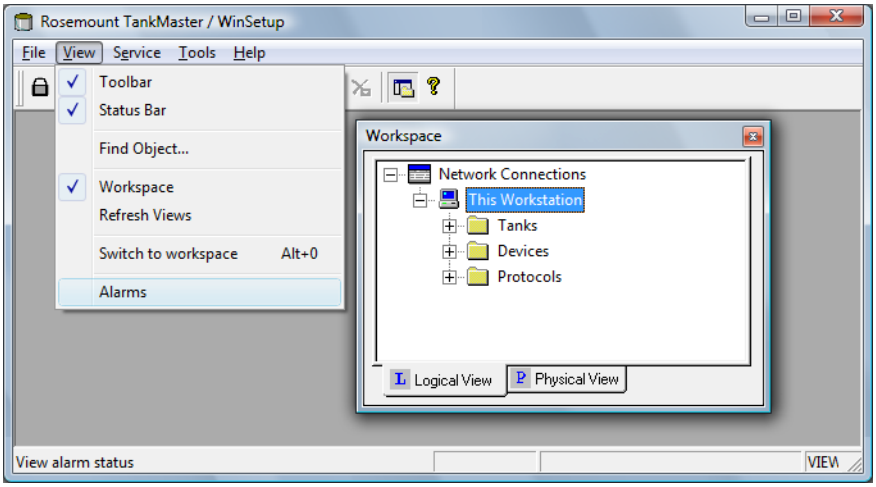
Measurement data for the selected tank is displayed in the *Tank View* window.

7.12 VIEWING ALARM STATUS

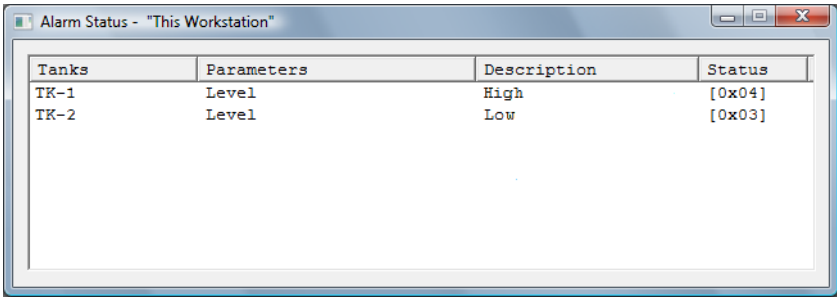
WinSetup lets you view alarm status for all tanks, a certain tank group, or a single tank.

To view the current alarm status for **all tanks** do the following:

1. In the WinSetup workspace, select the TankMaster workstation (or the *Tanks* folder) where the tanks are installed:

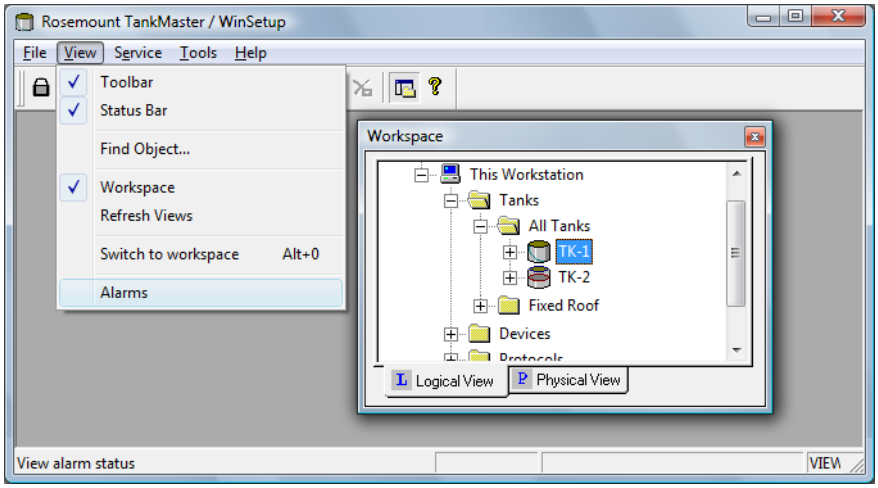


2. From the **View** menu choose **Alarms**. The *Alarm Status* window presents a list of alarms for all the tanks connected to the selected TankMaster workstation:

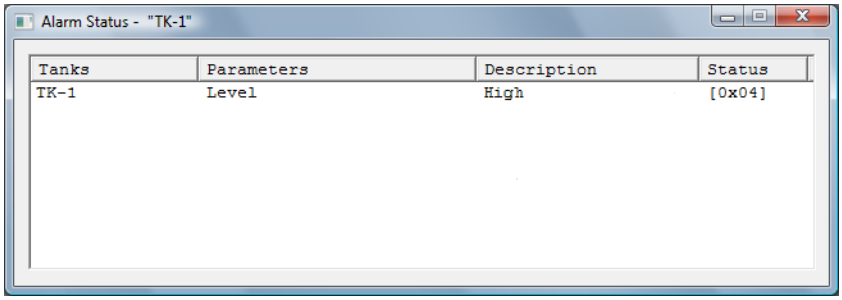


To view the alarm status of a **single** tank:

1. Open the *Tanks* folder and select the desired tank:



2. From the **View** menu choose **Alarms**. The *Alarm Status* window presents the current alarms for the selected tank:



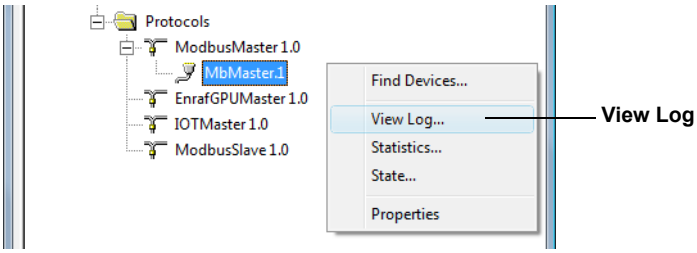
7.13 PROTOCOL HANDLING

7.13.1 Logging the Channel Communication

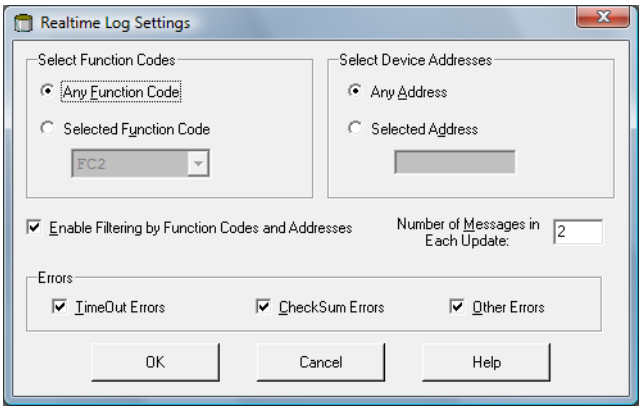
WinSetup allows you to log communication on the various communication protocol channels. You can log specific devices, as well as filter out certain function codes and error types.

To log the communication of a particular protocol channel do the following:

1. In the WinSetup workspace, select the protocol channel icon:



2. Click the right mouse button and choose the **View Log** option, or from the **Service** menu choose **Channels/View Log**.

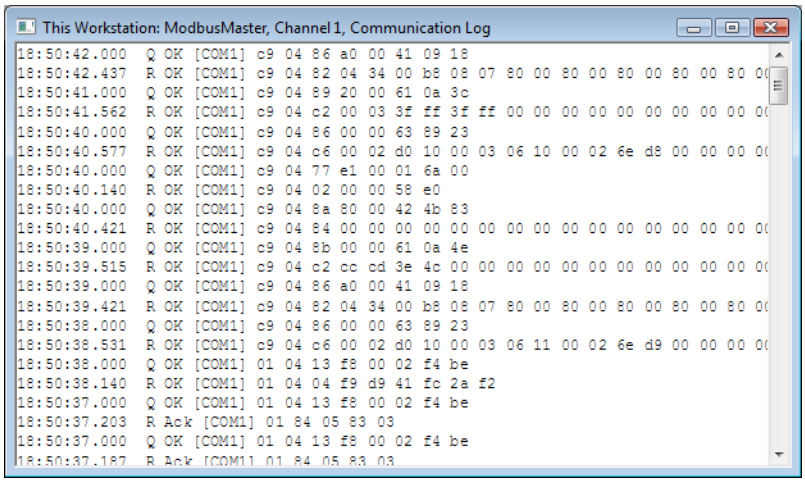


3. Specify a log profile. You can filter out certain function codes and devices as well as error types:

Table 7-1. Realtime log settings

Filter Settingv	Description
Function Code	A Function Code defines a specific action or type of data. You can log all function codes or a specific code.
Device Address	You can log all devices or a device with a certain address by your own choice. **Note**! The device address is automatically copied from the current settings in the *File Log Settings* window, see “Saving the Communication Log to File” on page 7-39. You can change this address to any other address that you want to log.
Enable Filtering	Mark this check box to enable filtering by function codes and addresses.
Errors	Select the check box for the type of error you like to record: *Time-out Errors*, *Check Sum Errors,* or *Other Errors*. You can select one or more check boxes.
Number of messages	Specify the number of messages that will be added each time the *Communication Log* window is updated. If the log is updated too quickly, you may increase the Number of messages value to reduce the update speed.

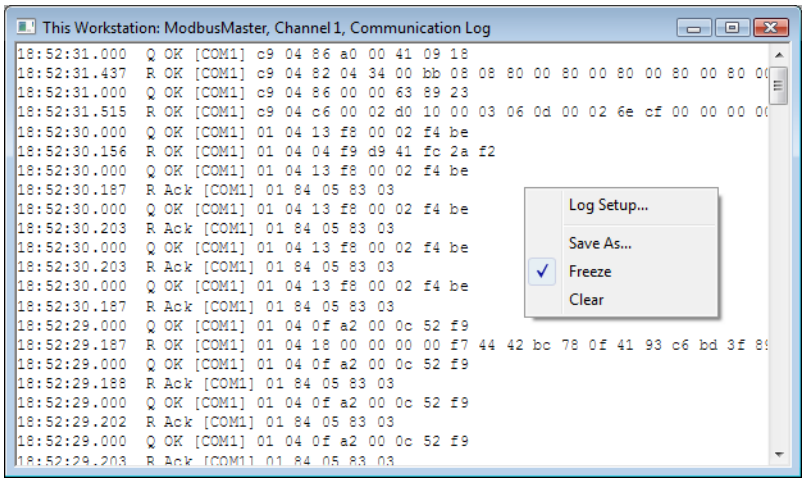
4. Click the **OK** button to open the *Communication Log* window.



The *Channel Communication Log* window is continuously updated with new data.

To stop WinSetup from feeding new data click the right mouse button and choose **Freeze**.

By clicking the right mouse button in the *Channel Communication Log* window you will get access to a number of useful options:



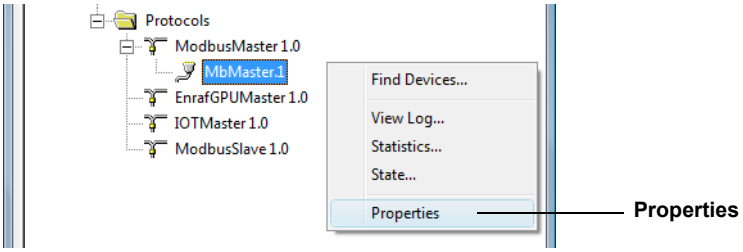
The **Save As** option lets you save the current log to file.

Choose the **Log Setup** option if you want to change the filtering settings.

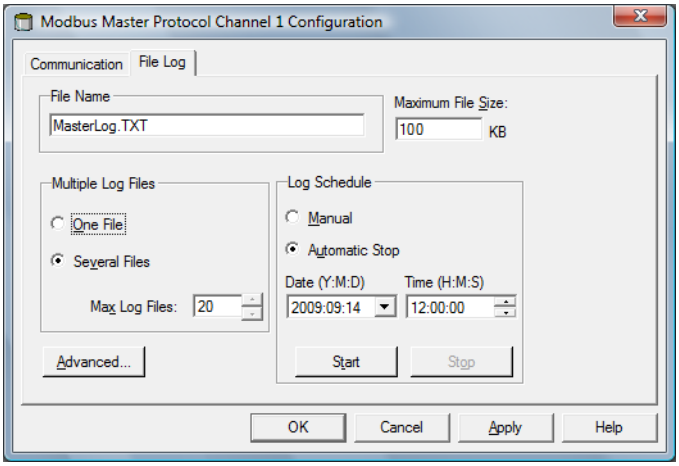
7.13.2 Saving the Communication Log to File

To save the communication log to file:

1. Select the protocol channel icon.



2. Click the right mouse button and choose **Properties,** or from the **Service** menu choose **Channels/Properties**.



3. Select the **File Log** tab.
4. Type a name of the log file in the **File Name** field and set the **Maximum File Size** to limit the amount of disk space required for storing log files. The **Maximum File Size** option can be used in combination with the **Multiple Log Files** option in order to store the log files on a number of floppy disks.
   The log file will be stored in the following folder:

PC operating system	Log file folder
MS Windows Vista	*C:\Rosemount\TankMaster\Log*
MS Windows XP	*C:\Program Files\Rosemount\TankMaster\Log*

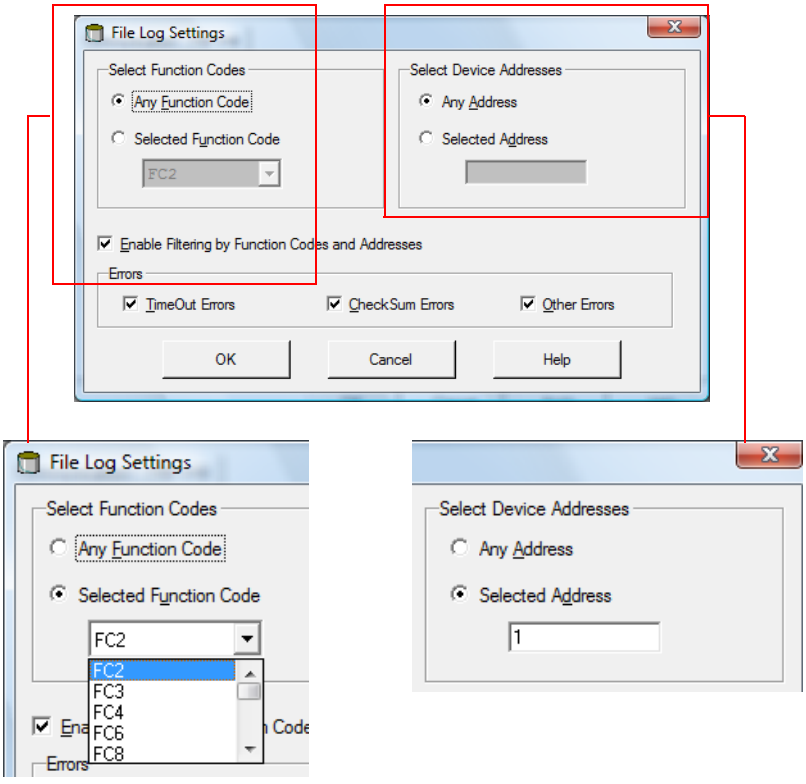
NOTE!
If the maximum number of files is reached, TankMaster will replace existing log files.

5. The **Multiple Log** files section allows you to optimize file size for storing on floppy disk. Choose the **One File** option if you prefer the log to be stored in a single file.
   By choosing the **Several Files** radio button, logging continues by creating new files whenever the size of the current log file reaches the **Maximum File Size** value. When using the **Several Files** option, also set the **Max Log Files** parameter to define the maximum number of log files to be created.
6. Set the **Log Schedule**.

   Manual: select Manual and click the Start button to start logging. The logging will stop when the Stop button is pressed, or the Maximum File Size is reached.

   Automatic Stop: set the Date and Time at which you want the logging to stop. Press the Start button to start the logging. The logging will stop when the set Date and Time is reached, the Stop button is pressed, or the Maximum File Size is reached.

7. Click the **Advanced** button if you would like to specify filtering options:



8. To restrict logging to a certain function code and/or a certain device address, select the **Enable Filtering by Function Codes and Addresses** check box.

9. Choose the **Selected Function Code** option if you would like to log a specific function.

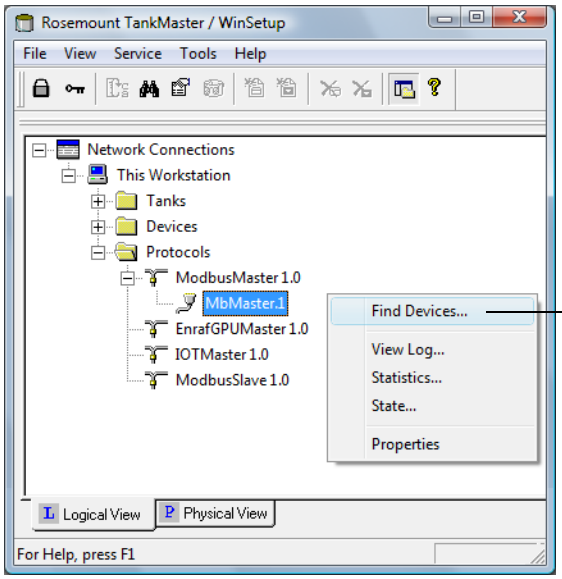
FC2	Read Inputs
FC3	Read Holding Registers
FC4	Read Input Registers
FC6	Write Single Register
FC8	Diagnostics
FC13	Program
FC14	Poll program complete
FC16	Write Multiple Registers
FC17	Report Slave ID
FC65	Change address

10. Choose one of the device address options; **Any Address** or **Selected Address**. Choose Selected Address if you want to log communication to a certain device.
11. Specify what type of errors to be logged by selecting the appropriate check boxes. You can choose one or more error types to be logged simultaneously.
12. Click the **OK** button.

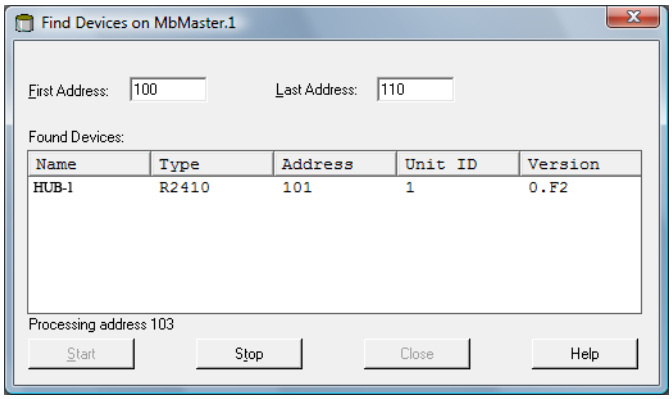
7.13.3 Searching for Connected Devices

You can search for devices on the communication protocol channels:

1. In the WinSetup workspace, open the **Protocols** folder and the appropriate protocol sub folder.
2. Select the desired protocol channel. For more information on Protocol Channels, see “Communication Protocol Setup” on page 5-6.



3. Click the right mouse button and choose the **Find Devices** option, or from the **Service** menu choose **Channels/Find Devices**.
4. Type the desired values in the **First** and **Last** address input fields in order to restrict the search to a certain range of addresses (maximum range is 1-255).



5. Click the **Start** button.

   Now the TRL2 fieldbus is scanned for devices within the specified address range.

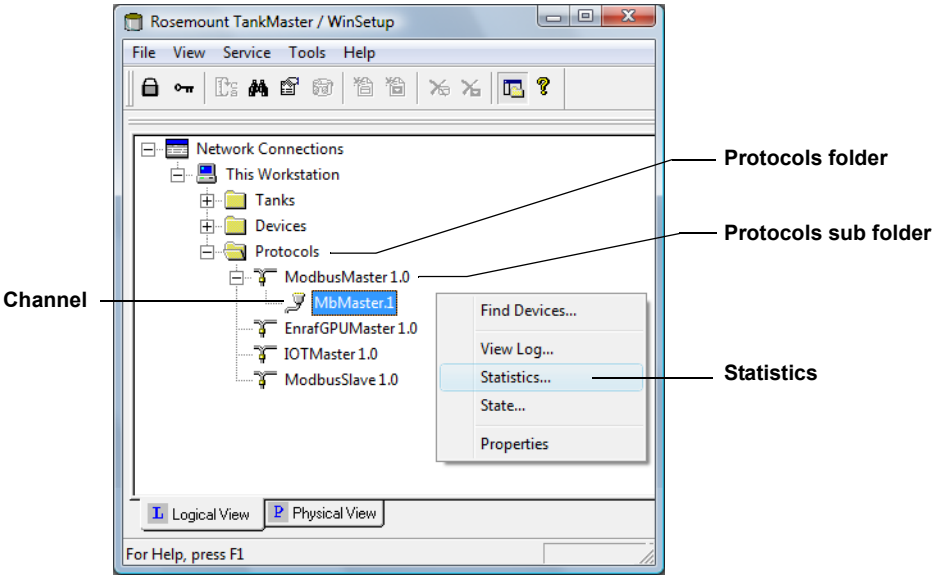
   The search result is a list of name, type, address, unit id and application software version of each device that was found.

7.13.4 Channel Statistics

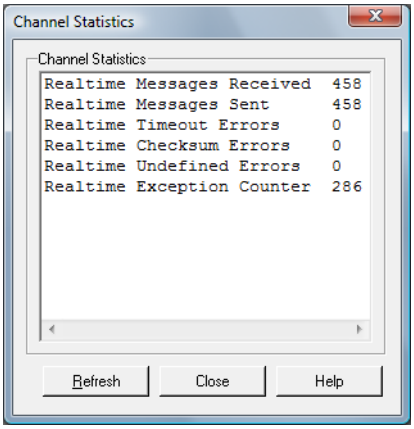
The Protocol Statistics function is a tool which can be used to check the quality of communication between the TankMaster workstation and the connected field devices.

To view statistical data for a protocol channel do the following:

1. In the WinSetup workspace, open the **Protocols** folder and the appropriate protocol sub folder.



2. Select the desired channel.
3. Click the right mouse button and choose the **Statistics** option, or from the **Service** menu choose **Channels/Statistics**.



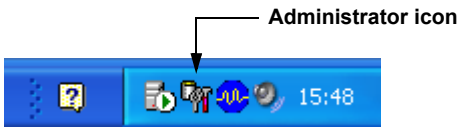
The *Channel Statistics* window lets you view a summary of messages and various error types.

7.14 TANKMASTER ADMINISTRATOR

The TankMaster Administrator program provides the option to select which TankMaster programs that will start automatically when the PC is turned on. It also allows you to check which TankMaster processes that are currently running.

By using the backup option, copies of the current WinOpi, WinSetup and Tank Server configurations can be stored. In the event of a PC operating system crash, resulting in corrupt TankMaster files, these backup files can be used to restore the TankMaster settings and the registry of the Windows XP operating system.

To open the *TankMaster Administrator*, click the icon on the right-hand side of the MS Windows Taskbar:

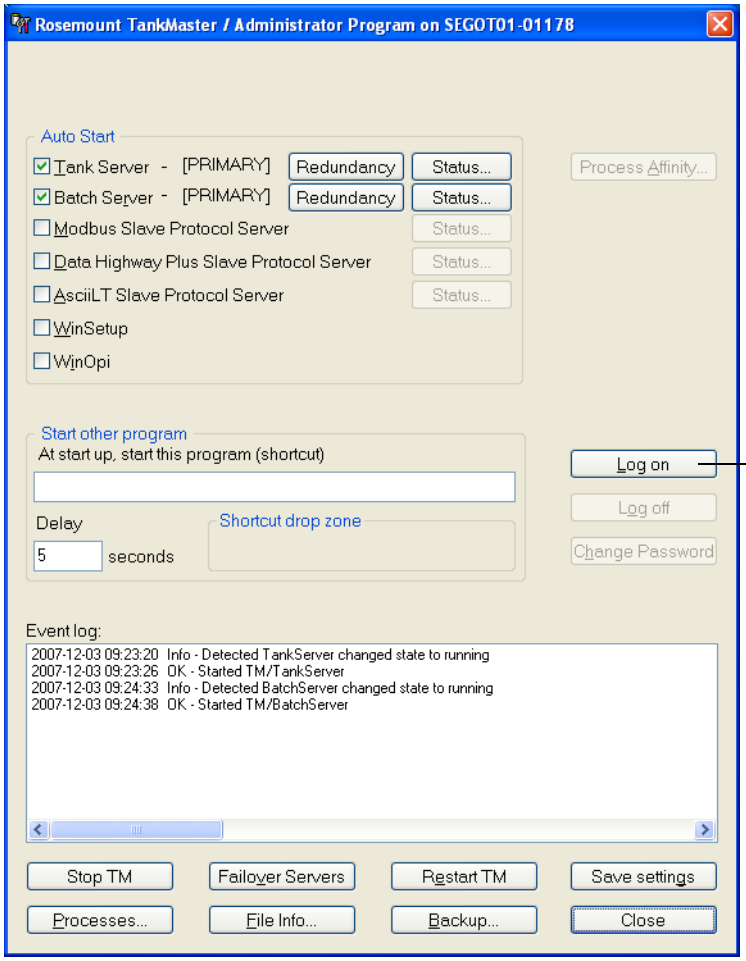


7.14.1 Log on

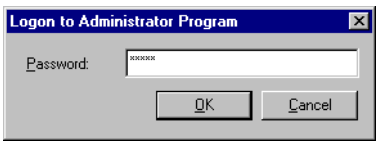
To be able to make any changes in the *TankMaster Administrator* window you need to use the **Log on** function.

To log on to the TankMaster Administrator do the following:

1. Open the *TankMaster Administrator* window by clicking the Administrator icon on the right-hand side of the MS Windows Taskbar.



2. Press the **Log on** button.



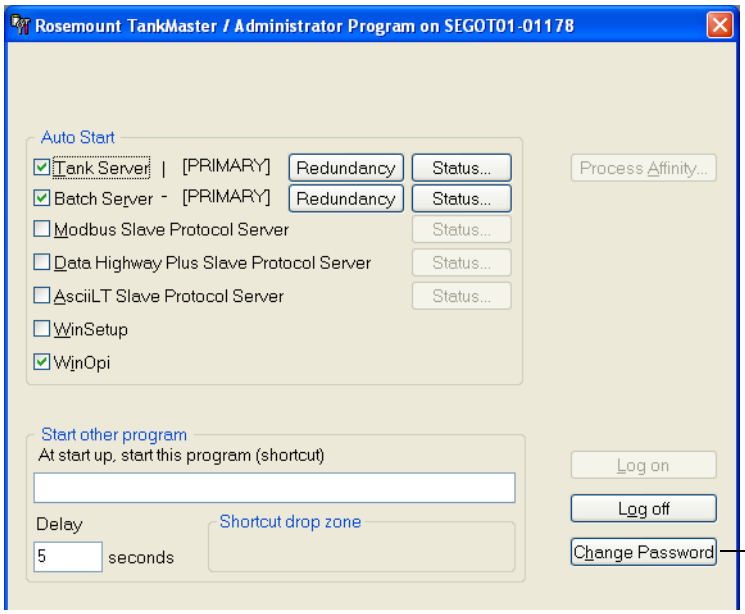
3. Enter the password and press **OK**.

NOTE!
The default password is **admin**.

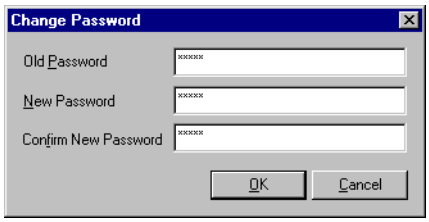
7.14.2 Changing the Administrator Program password

To change the TankMaster Administrator password, do the following:

1. Open the *TankMaster Administrator* window.



2. Log on to the Administrator.
3. Click the **Change Password** button.
4. Enter the old and the new passwords. Confirm the new password.



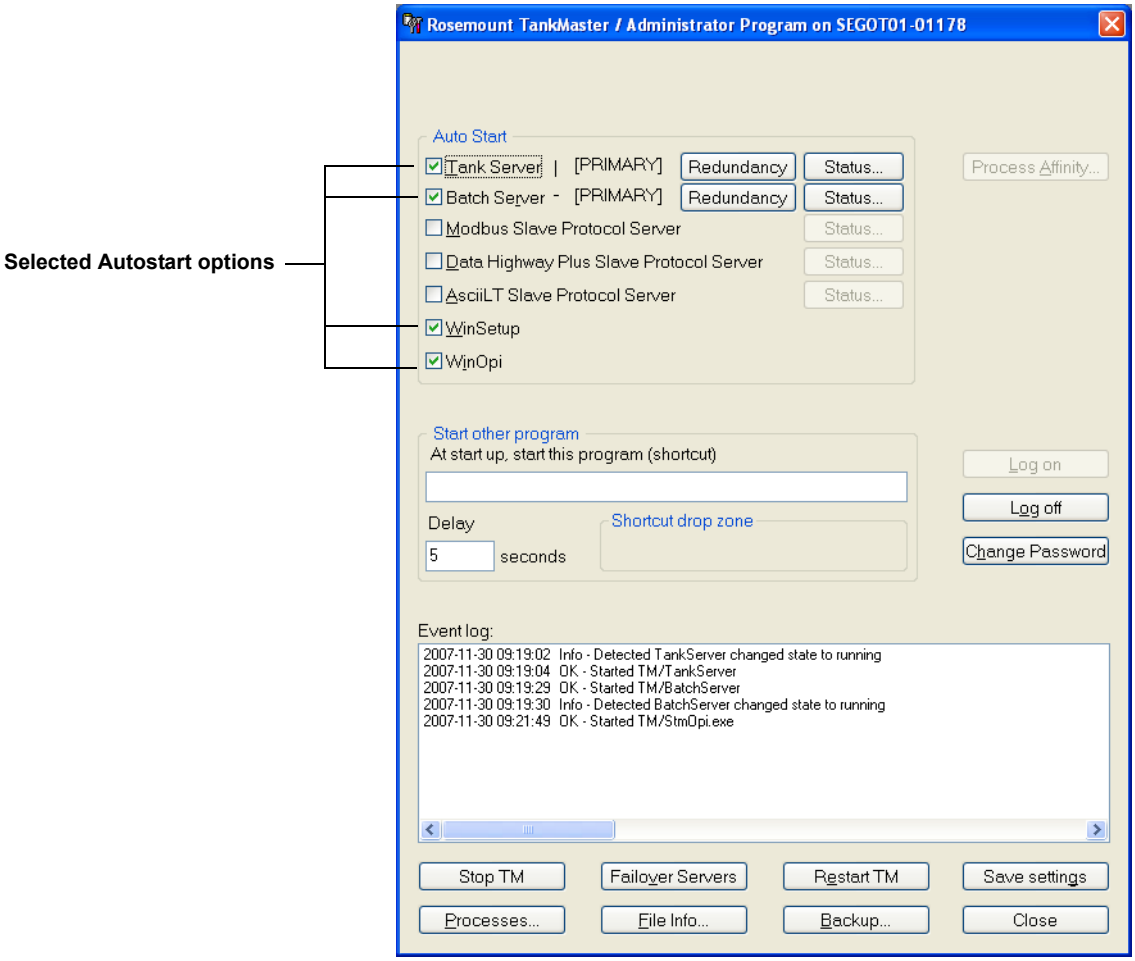
5. Press **OK**.

7.14.3 Autostart

The Autostart function lets you specify programs to start automatically when the TankMaster computer is started.

To configure the Autostart option:

1. Open the *TankMaster Administrator* window.



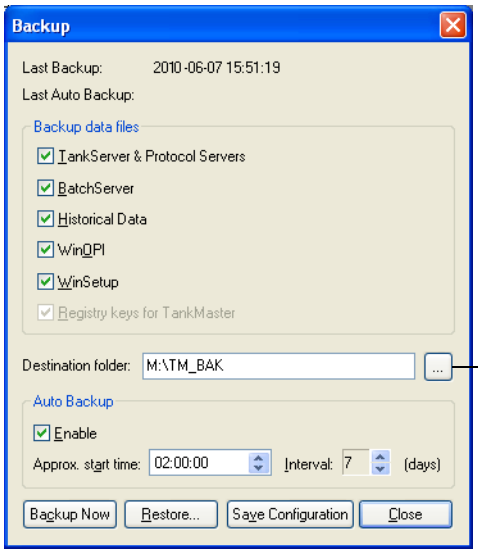
2. Select the check boxes for the programs you want to start automatically.
3. The Autostart function is activated next time the TankMaster PC is started.

7.14.4 Backup

The backup function can be used to save configuration data for devices and tanks as well as workspace settings for WinSetup and WinOpi.

To make backup copies of the current configuration do the following:

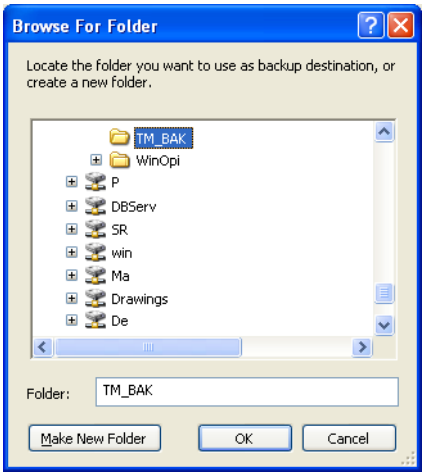
1. Open the *TankMaster Administrator* window and click the **Backup** button.



The *Backup* window contains the following:

- Information on when the Last Backup and Last Auto Backup were performed
- Backup data files to create
- File path to use for the backup files
- Auto Backup settings

2. Select which data files to create in the **Backup data files** pane.
   - The *TankServer* option lets you backup tank and device configurations (the Tank server must be running).
   - The *Batch Server* option lets you backup the batch database files (the Batch server must be running). Note that the Batch server automatically removes a batch from the database after a certain number of days, see the *TankMaster Batch Handling Reference Manual* for more information.
   - The *Historical Data* option lets you backup any previously created Historical Data, see the *WinOpi User´s Guide* for more information.
   - The *WinOpi* and *WinSetup* options allows you to save the workspace configuration such as groups, colors, network settings etc.
   - The *Registry keys for TankMaster* option lets you save the TankMaster settings of the MS Windows registry.
3. Choose the destination folder by pressing the **Browse** button.

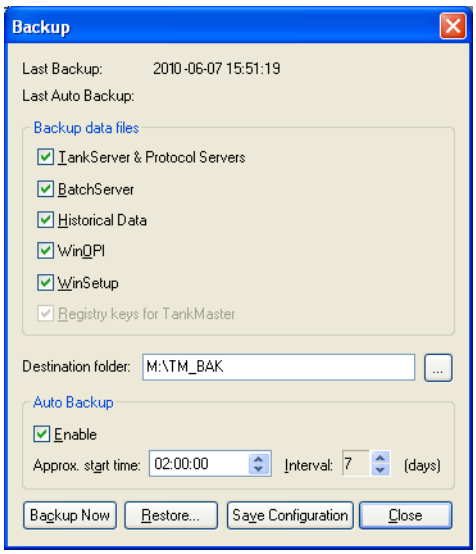


4. Choose the desired file destination. TankMaster automatically creates subdirectories for WinOpi, WinSetup, and Tankserver files.
5. Click the **OK** button to close the *Browse for Folder* window and return to the *Backup* window.
6. In the **Auto Backup** pane, select the **Enable** check box to enable automatic backup. Also set **Start time** and **Interval** (1-30 days). This will automatically backup the selected backup data files at the specified start time and interval.
7. Click the **Save Configuration** button to save the current *Backup* window settings.
8. Click the **Backup Now** button if you like to make a manual backup of the selected items in the **Backup data files** pane.
9. Click the **OK** button.

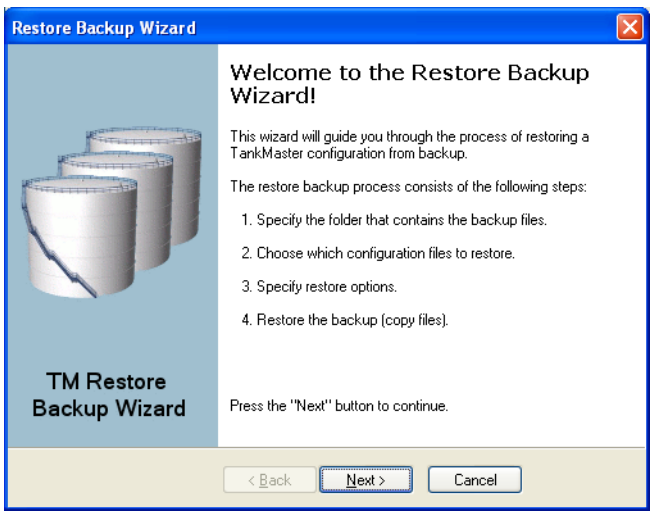
7.14.5 Restore

If the PC operating system has crashed resulting in corrupt TankMaster files, the TankMaster settings can be restored by using the backup files. To restore the TankMaster configuration and data files do the following:

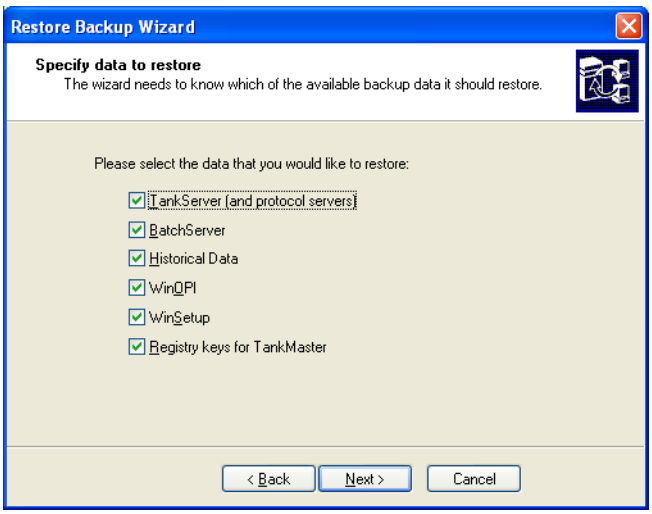
1. Check that WinSetup and WinOpi are closed. You may click the Processes button in the TM Administrator program to check if any TankMaster programs are running. Note that the TankMaster Administrator program itself also appears in the *Processes* window, see “Processes” on page 7-55. (You may also open the *Windows Task Manager* to make sure that the **Tankserver.exe** program is closed).
2. Open the *TankMaster Administrator* window.
3. Click the **Backup** button. The *Backup* window appears.



4. In the *Backup* window click the **Restore** button.

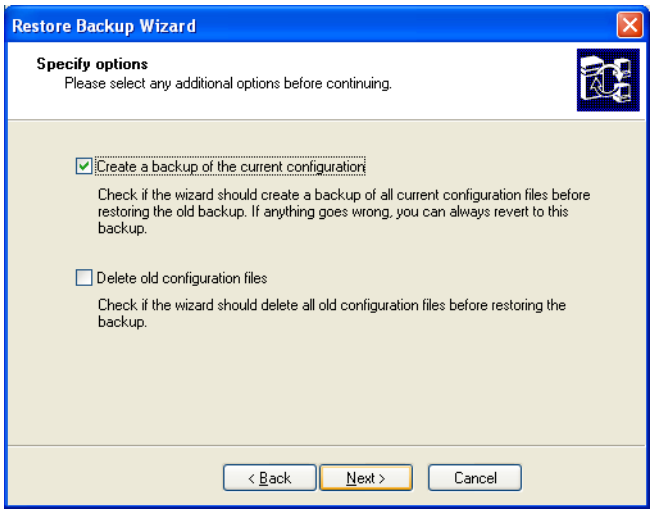


5. The *Restore Backup Wizard* lets you restore tank and device configuration, BatchServer data and Historical data. You may also restore WinOpi and WinSetup configurations such as groups, color, network settings etc.
6. Click the Next button and follow the instructions. You will now be guided through a step-by-step instruction that lets you specify the folder where backup files are stored, and the type of data to be restored. You may also create a backup of the current configuration.
7. When the backup source folder is selected, you will be prompted to specify the data to be restored:

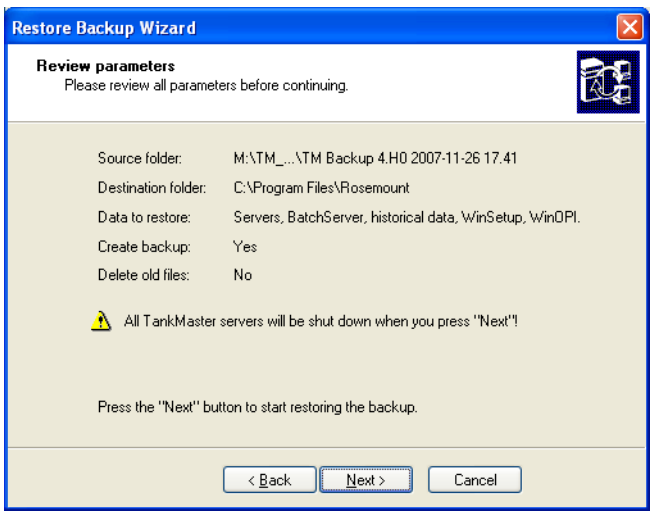


NOTE
Do not select the Registry key option if upgrading from TankMaster version 4.H0 or older to version 4.H1 or newer.
The Registry key option must not be used if TankMaster has been re-installed on another hard disk drive, or in another directory than the original installation. The file paths to the TankMaster configuration and data files must be the same for the backup files and the restored files.

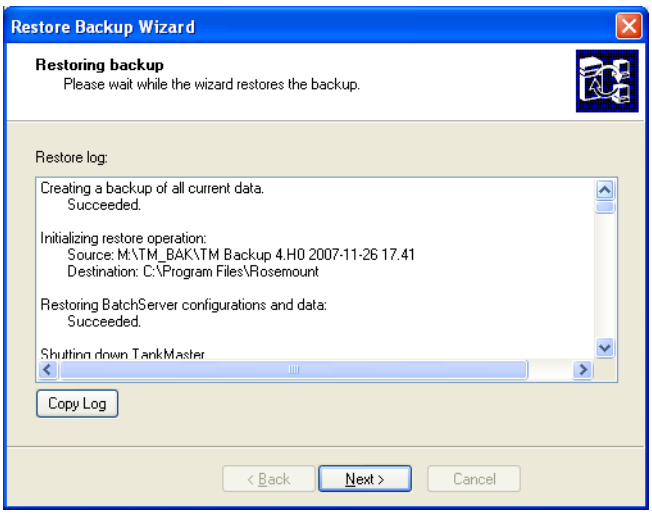
8. The following options will also need to be specified:



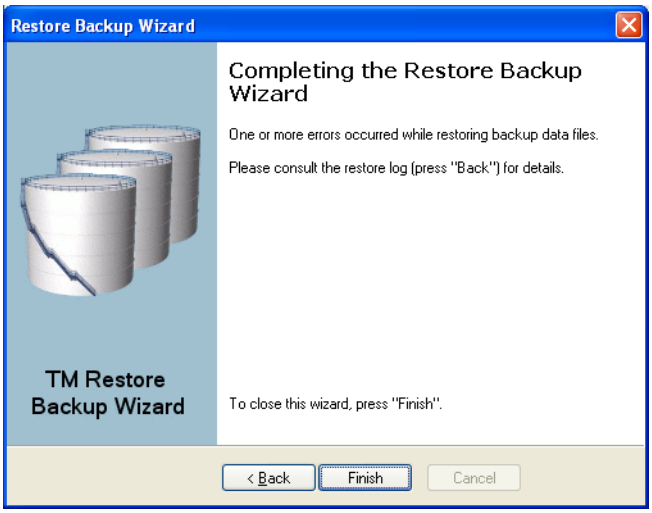
9. The first option, *Create a backup of the current configuration,* should **not** be used if the restore function is used to replace corrupt configuration files.
   The *Delete old configuration files* option clears all configuration files which are not replaced by the Restore function.
   If this option is used it may be a good idea to backup the current configuration files in case you need to recover the current TankMaster configuration at a later point of time.
10. Click Next and review the restore settings:



11. Click Next to start the restore function:



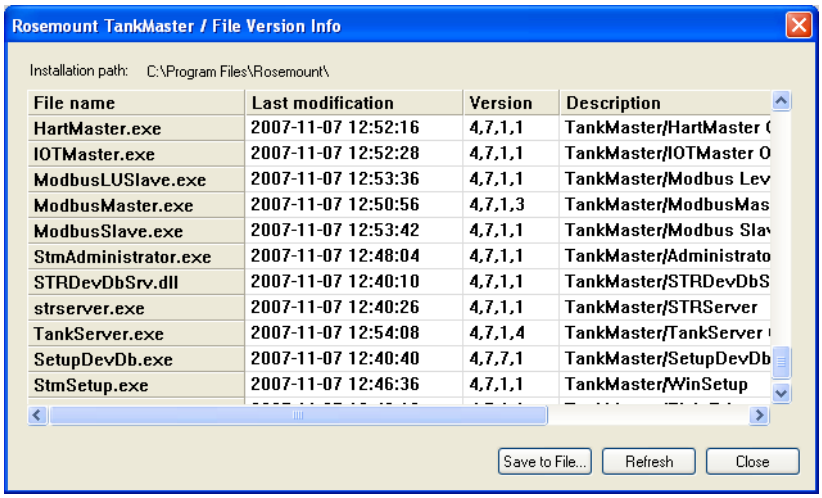
12. The Copy Log button can be used to store the restore log in the ...Rosemount\Server\Log directory. Click the Next button to continue.



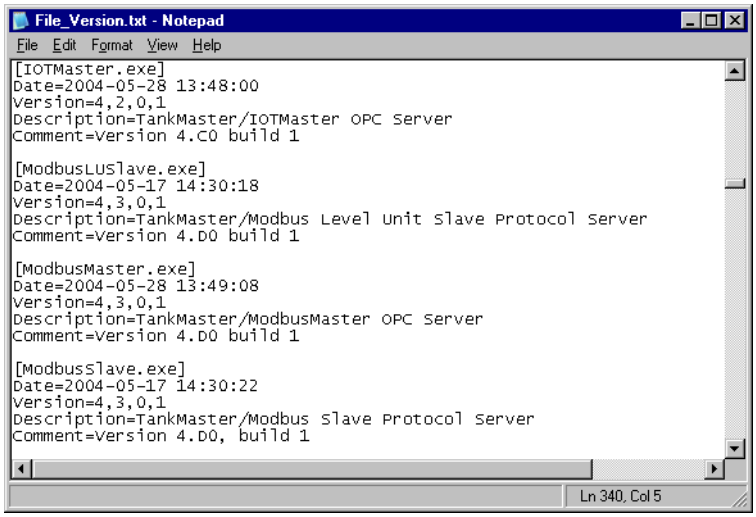
13. Check that no errors occured during the restore process and click the Finish button to close the restore wizard. In case an error occured you may click the Back button to find the error in the restore log.
14. Open the server data backup folder (in the current example: M:\TM_BAK\TM Backup xxx\Server\Data) and copy the contents.
15. Open the C:\Program Files\Rosemount\Server\Databackup folder (C:\Program Files is the folder where TankMaster is installed) and paste the copied files.
16. Restart WinSetup and WinOpi to check that all settings are restored.

7.14.6 File Version Information

The **File Info** option allows you to view a list of all the files included in the TankMaster software package. The list presents file versions and brief descriptions.



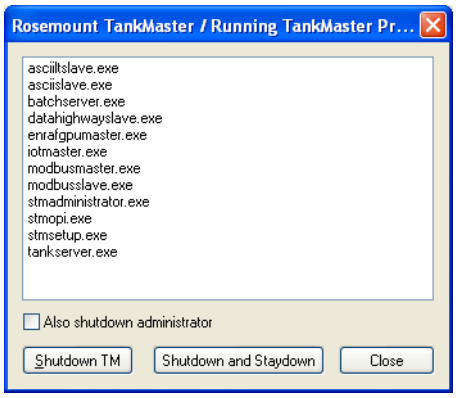
The list can be stored by using the **Save to File** button. The file is stored in text format which can be opened by any word processing program:



NOTE!
When entering the filename in the Save to File dialogue, also enter filetype **txt**, e.g. enter File_Version.**txt**.

7.14.7 Processes

To view the running TankMaster programs, click the **Processes** button in the *TankMaster Administrator* window:



The **Shutdown TM** button lets you close all TankMaster programs except the TankMaster Administrator. In case a TankMaster client requests data, the TankServer starts up again.

By using the **Shutdown TM and Staydown** button the TankServer stays down regardless of any requests.

If the **Also shutdown administrator** check box is selected, the TM Administrator program is shut down as well.

Click the **Update** button to update the contents of the *Processes* window.

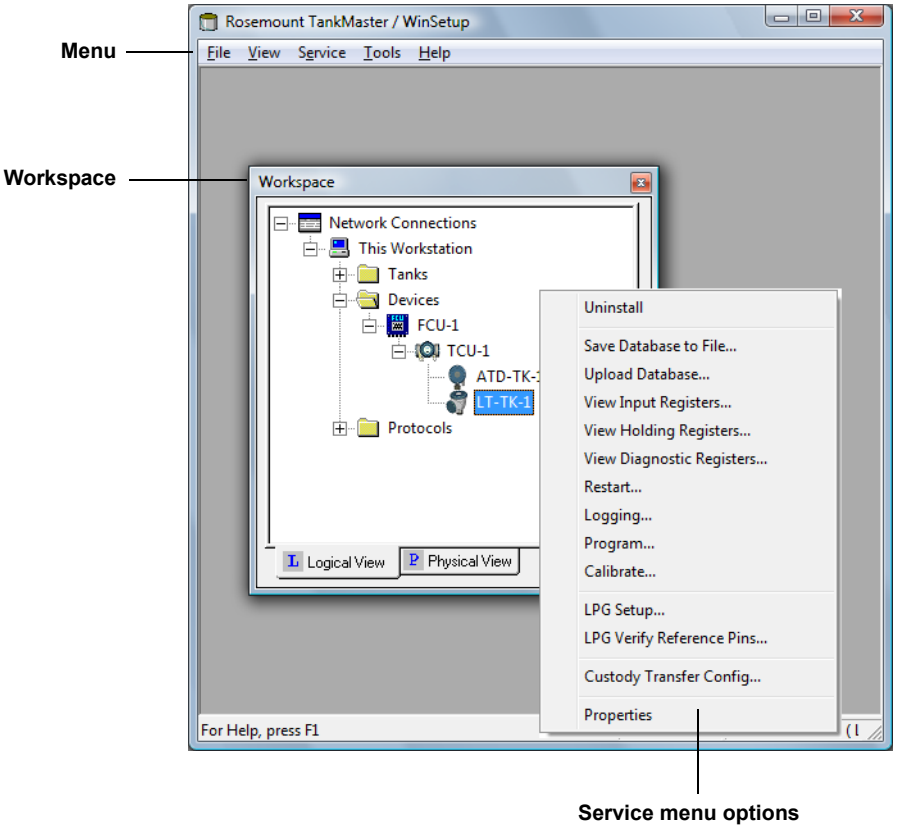
Section 8 Menu Guide

8.1 File . . . . . page 8-2
8.2 View . . . . . page 8-2
8.3 Service . . . . . page 8-3
8.4 Tools . . . . . page 8-9
8.5 Help . . . . . page 8-9

This section provides a brief guide of the menus in the *TankMaster WinSetup* configuraiton software. Clicking the right mouse button will result in different menu options depending on which folder or device that is selected in the TankMaster workspace.

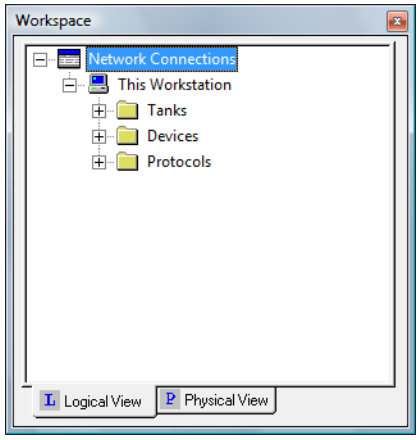
The Service menu options are available by clicking the right mouse button on a specific folder or device as illustrated below, as well as in the menu bar at the top of the TanMaster workspace.

Figure 8-1. Service menu options are available by clicking the right mouse button



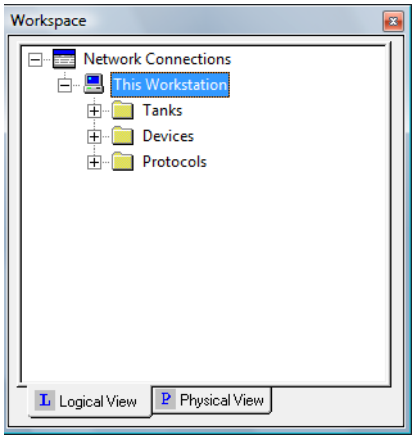
8.1 FILE

New Connection	Connect to another tank server.



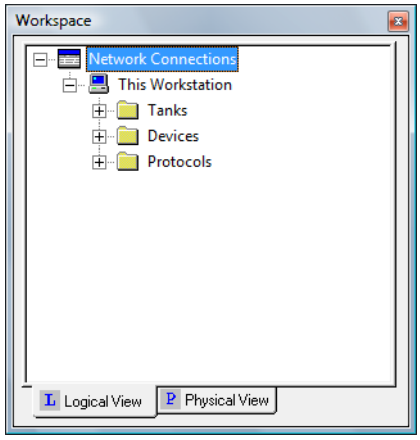
If a workstation is selected, new options are available in the File menu:

Install New >	Tank	Install new tanks by starting the tank installation wizard.
Install New >	Device	Install new devices by starting the device installation wizard.
Log On		Log on as Administrator, Supervisor or Operator.
Log Off		Log off from TankMaster to View Only mode.
Exit		Exit the WinSetup program.



8.2 VIEW

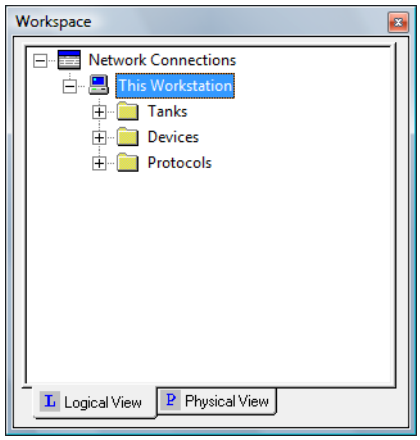
Toolbar	Hide or reveal the Toolbar.
Status bar	Hide or reveal the Status bar.
Find Object	Search for a certain tank or device.
Workspace	Open or close the Workspace window.
Refresh Views	Update the current view.
Alarms	Show a list of current alarms for all tanks in the network, or tanks connected to a certain workstation.



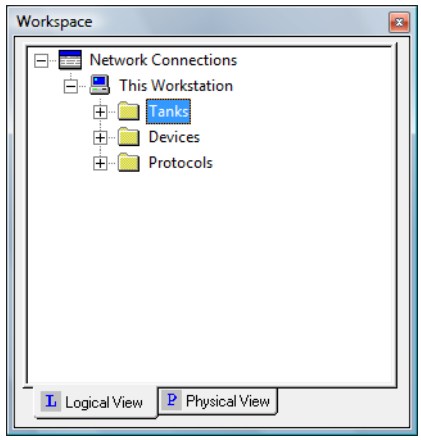
8.3 SERVICE

The service options are found in the Service menu or by clicking the right mouse button on a specific folder, device, or tank.

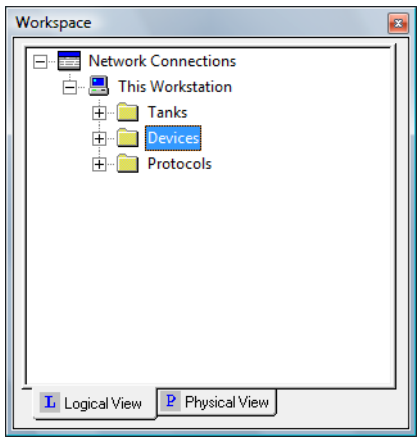
Servers >	Rename	Change the server name.
	Disconnect	Disconnect from the current server.
	Configure Digital Alarms	Configure the system's digital alarms. Used for IOTs.
	System Status Overview	Opens an overview of installed devices, protocol servers, and more.
	Setup	Choose measurement units, ambient air source, and other system parameters.



Tanks >	Install New	Install a new tank.
	Summary Tank View	View various tank measurement variables such as level, level rate, average temperature etc. for all installed tanks.
	Approved Tanks (option)	Show a list of tanks approved for custody transfer.

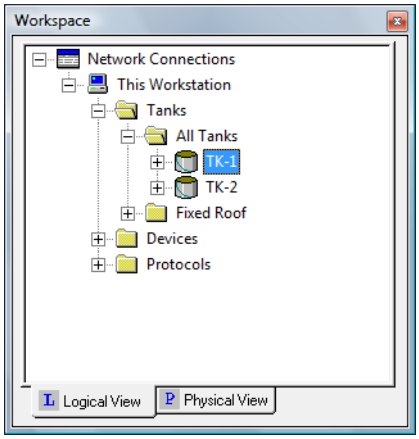


Devices >	Expand All	Show all items in the Device folder.
	Collapse All	Close the device folder.
	Install New	Install new devices by starting the device installation wizard.
	Program All	Download an application program to a group of devices.
	Save Databases of All to Files	Save the database registers for several devices.
	Overview IOT Terminals	View an overview of installed IOT terminals.
	Register Log Overview	Show a list of current log status for the connected devices.



When selecting a tank in the Tanks folder, new options are available under the **Service > Tanks** menu:

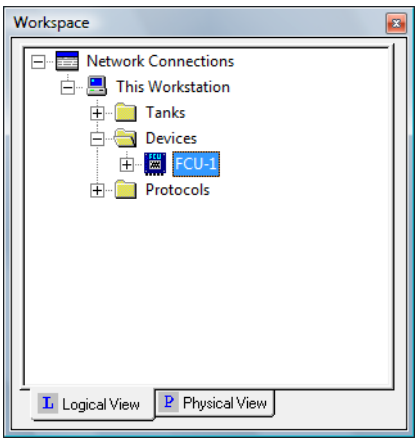
Tanks >	Unistall	Remove the selected tank.
	Rename	Change the tank name.
	Open Tank View	View various tank related variables such as level, level rate, average temperature etc. for a single tank.
	Calibrate	Use the built-in calibration function to adjust the still-pipe correction factor and Calibration Distance.
	Tank Entry	Configure product data for inventory calculations.
	Hybrid Tank Setup	Define pressure sensor positions for hybrid tank gauging.
	Tank capacity	Specify a Tank Capacity Table (strapping table).
	Tank Volume Calculation	Define settings for the tank volume calculation.
	Properties	View and change tank configuration parameters.



When selecting a device in the device folder, new options are available under the **Service > Devices** menu:

2160 Field Communication Unit

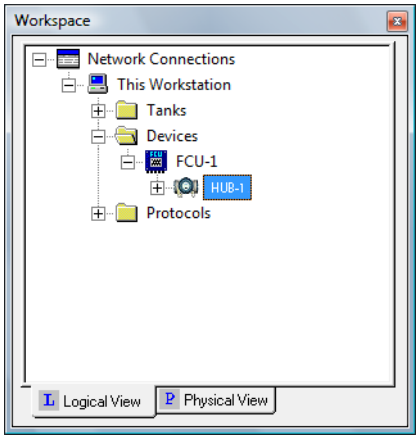
Devices >	Expand all	Show all devices connected to the Rosemount 2160 Field Communication Unit.
	Collapse All	Close the device folder.
	Uninstall	Remove the selected device.
	Save database to file	Save the current holding register setup to file. This function can be useful if you would like to save a backup of the current database. It can be downloaded to a device by choosing the Upload Database option.
	Upload Database	Upload a database to the selected device.
	View Input Registers	View input register values. You can choose between a predefined set of registers or you can specify a certain range of registers.
	View Holding Registers	View holding (database) register values. You can choose between a predefined set of registers or you can specify a certain range of registers.
	View Diagnostic Registers	View the diagnostic registers for the selected device.
	Restart	Restart the selected device. The boot software performs an initialization procedure and memory tests.
	Logging	Log the diagnostic registers.
	Properties	View and change the current device settings (not in View Only mode).



2410 Tank Hub

See the Rosemount 2410 Tank Hub Reference Manual (Document no. 300530EN) for more information.

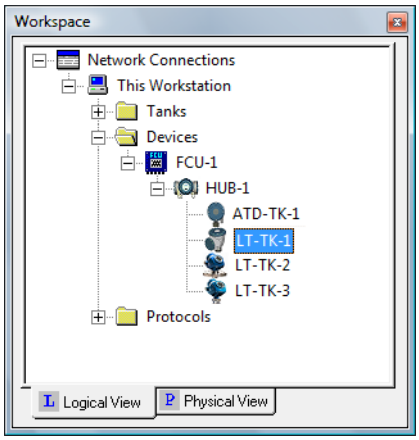
Devices >	Expand all	Show all devices connected to the selected Rosemount 2410 Tank Hub.
	Collapse All	Close the device folder.
	Uninstall	Remove the selected device.
	Save Database to File	Save the current holding register setup to file. This function can be useful if you would like to save the current database as a backup. It can be downloaded to a device by choosing the Upload Database option.
	Upload Database	Upload a database to the selected device.
	View Input Registers	View input register values. You can choose between a predefined set of registers or you can specify a certain range of registers.
	View Holding Registers	View holding (database) registers. You can choose between a predefined set of registers or you can specify a certain range of registers.
	View Diagnostic Registers	View diagnostic registers for the selected device.
	Restart	Restart the device. The boot software performs an initialization procedure and memory tests.
	Logging	Log the diagnostic registers.
	Program	Download an application program to the device.
	Live List	Show a list of devices connected to the Tankbus.
	Manual Relay Control	Manually change relay status.
	Simulation	Simulate field devices to verify communication with a host system.
	Properties	View and change the current device settings (not in View Only mode).
	Write Protect	Protect the holding register database from unintentional changes.



5900S Radar Level Gauge

See the Rosemount 5900S Reference Manual (Document no. 300520EN) for more information.

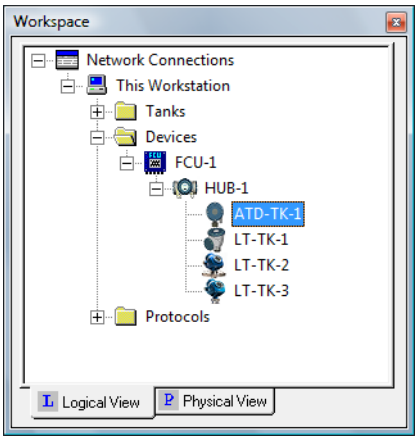
Devices >	Uninstall	Remove the selected device.
	Save Database to File	Save the current holding register setup to file. This function can be useful for saving the current database as a backup. It can be uploaded to the device by choosing the Upload Database option.
	Upload Database	Upload a database to the selected device.
	View Input Registers	View input registers. You can choose between a predefined set of registers or you can specify a certain range of registers.
	View Holding Registers	View holding (database) registers. You can choose between a predefined set of registers or you can specify a certain range of registers.
	View Diagnostic Register	View diagnostic registers for the selected device.
	Restart.	Restart the device. The boot software performs an initialization procedure and memory tests.
	Logging	Log the diagnostic registers.
	Program	Download an application program to the device.
	Calibrate	Use the built-in calibration function to adjust the still-pipe Correction Factor and the Calibration Distance.
	LPG Setup	Configure the device for LPG measurements.
	LPG Verify Reference Pins	Verify that the distance between actual and nominal position of the reference pin is within the approved limit.
	Custody Transfer Config (Option)	Configure the level gauge for custody transfer.
	Write Protect	Protect the holding register database from unintentional changes.
	Properties	View and change the current device settings (not in View Only mode).



Auxiliary Tank Devices (ATDs) (2240S, 2230 etc.)

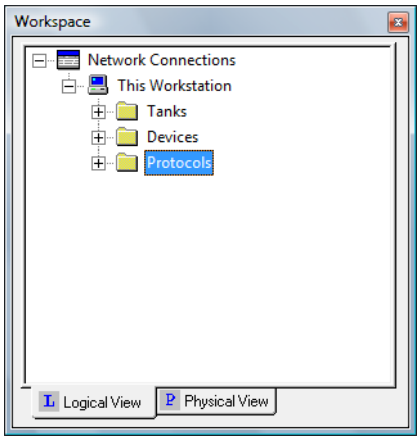
For more information about the various ATD devices, see the reference manual for the specific device.

Devices >	Uninstall	Remove the selected device.
	Save Database to File	Save the current holding register setup to file. This function can be useful for saving the current database as a backup. It can be uploaded to a device by choosing the Upload Database option.
	Upload Database	Upload a database to the selected device.
	View Input Registers	View input register values. You can choose between a predefined set of registers or you can specify a certain range of registers.
	View Holding Registers	View holding (database) register values. You can choose between a predefined set of registers or you can specify a certain range of registers.
	View Diagnostic Register	View diagnostic registers for the selected device.
	Restart	Restart the device. The boot software performs an initialization procedure and memory tests.
	Logging	Log the diagnostic registers.
	Custody Transfer Config	Configure the device for custody transfer.
	Properties	View and change the current device settings (not in View Only mode).



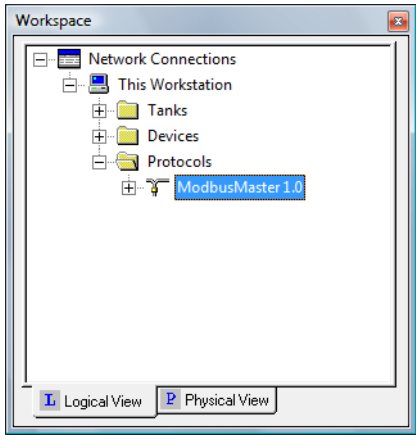
Protocols

Protocols >	Configure	Connect to the various protocol servers.

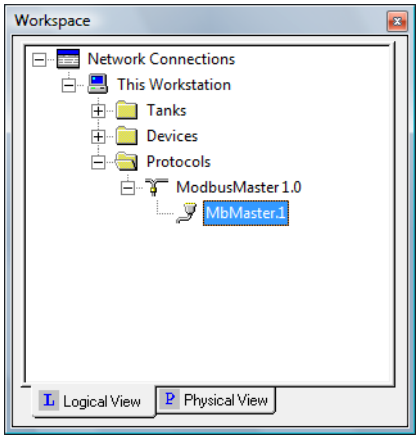


When selecting a specific protocol, new options will be available:

Protocols >	Disable	Disable the selected protocol.
	Properties	Open the protocol Properties window and choose a communication channel.



Channels >	Find Devices	Search for devices within a certain address range.
	View Log	View the *Realtime Log* window. You can choose to view only certain function codes, device addresses and error types..
	Statistics	Open the *Channel Statistics* window to display various statistical data such as Messages received, Messages sent, Timeout errors.
	State	Display information about the selected protocol channels.
	Properties	View and change the communication, file log and tank mapping (for slave protocols) settings (not in View Only mode).



Preferences

Preferences	Specify Tag prefixes and Tank View layout.

8.4 TOOLS

Applications	Customize the Tools menu.	
Administrative Tools >	User Manager	Manage the user accounts.
	User Information	Display information about the current user.
	Set Password	Change the password for the current user.
	Set Inactivity Timeout	Define the user inactivity timeout.
	Set Required Access Levels	Set the required access levels for various TankMaster operations.
	Tank Echo Viewer	Open the tank scan viewer for the selected level gauge.
	Custom menu	Open a User defined menu item.

8.5 HELP

Online Help	Open the online help.
Reference Manual	Open the WinSetup Reference Manual using the Acrobat Reader program.
Set Reference Manual	Specify which Reference Manual (language version) to open with the Reference Manual menu item.
About Setup	Display information about the WinSetup program.

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